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1931

FORTY-SECOND YEAR OF PUBLICATION

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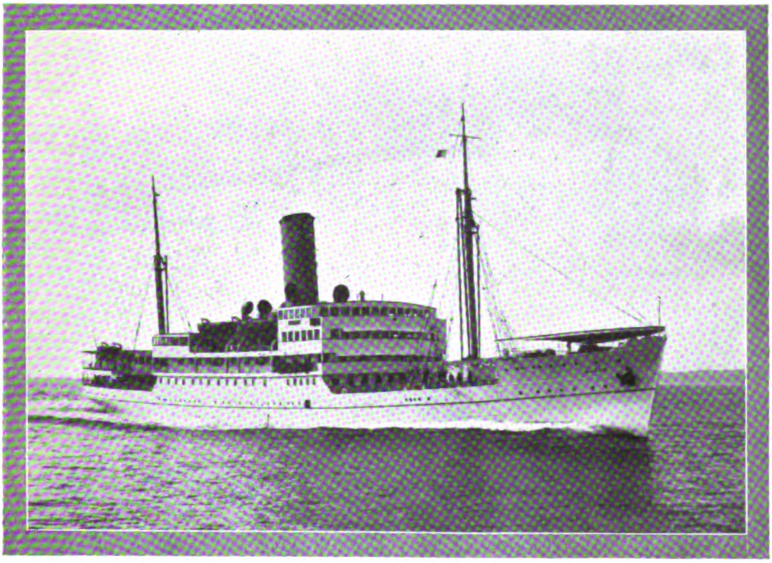

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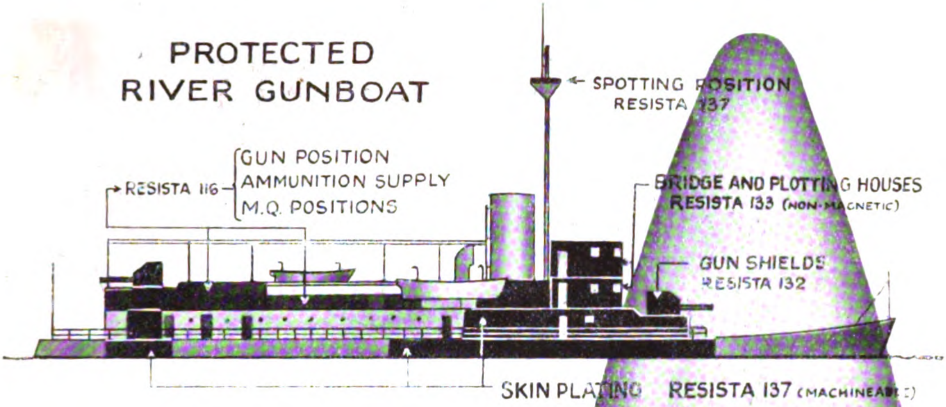

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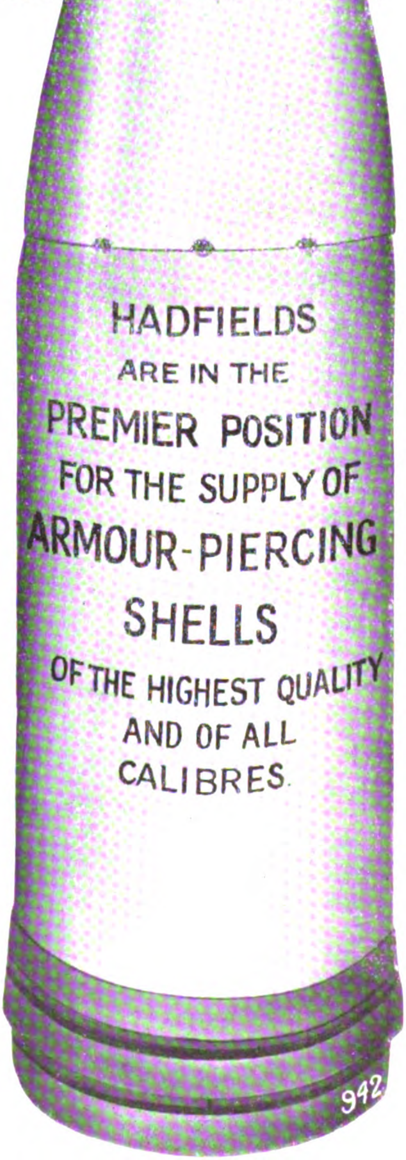

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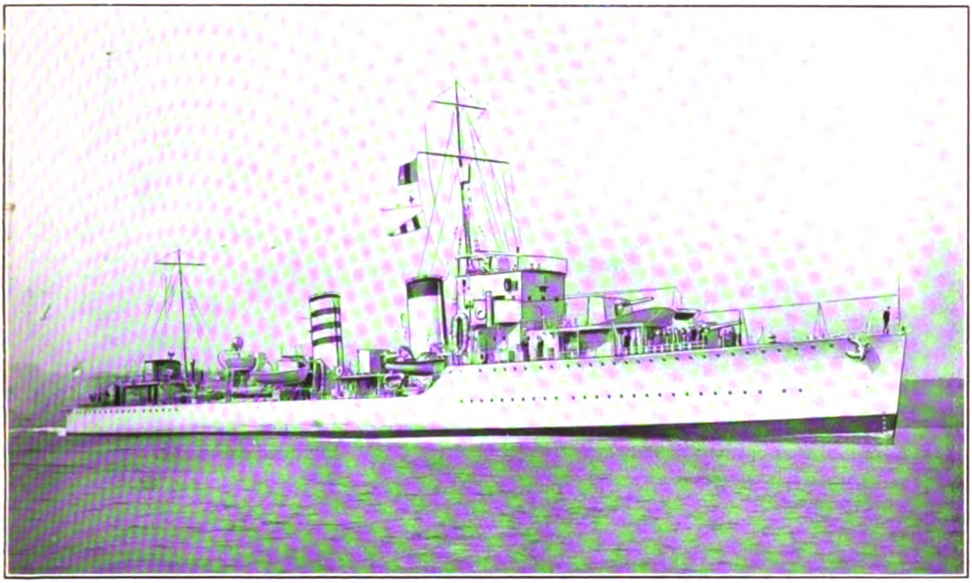

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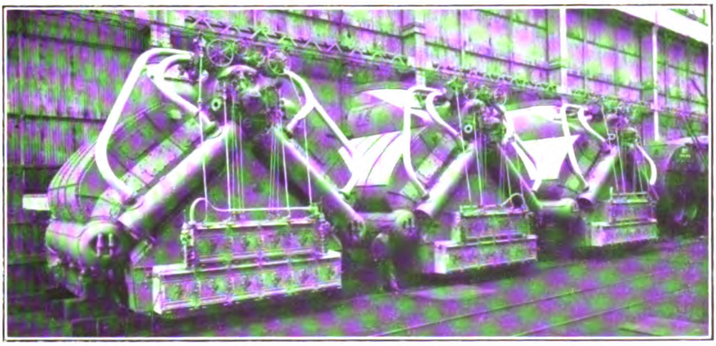

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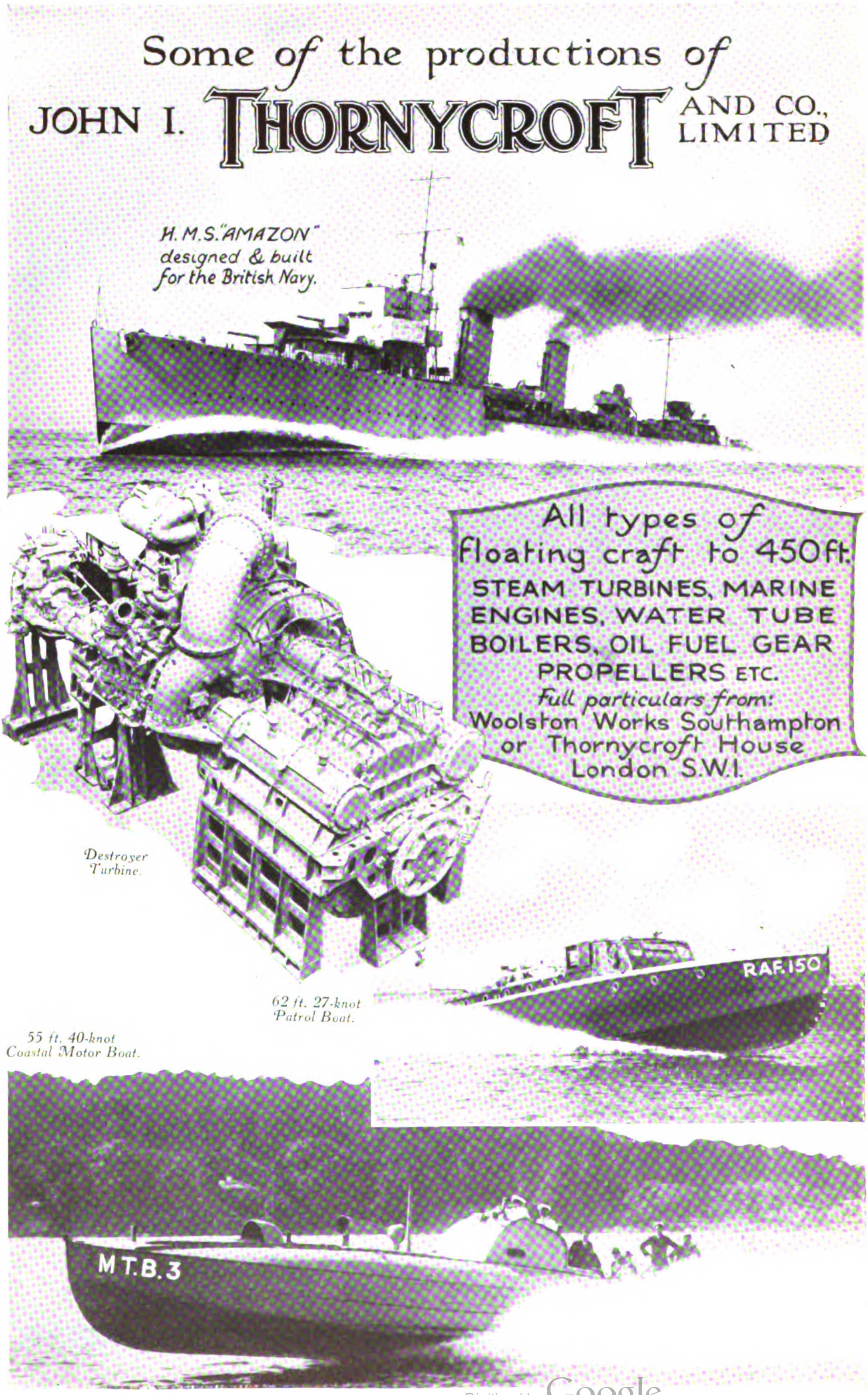

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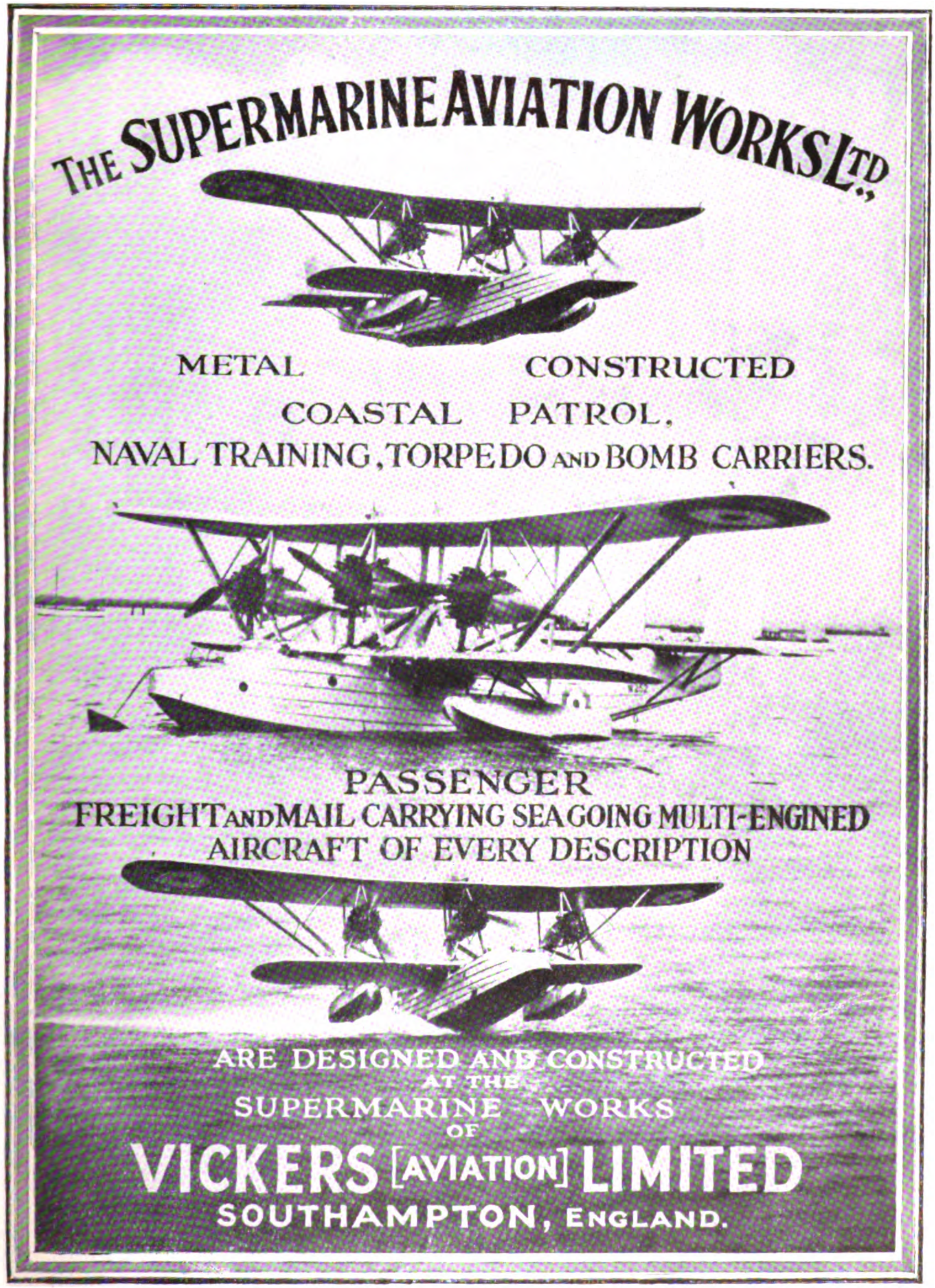

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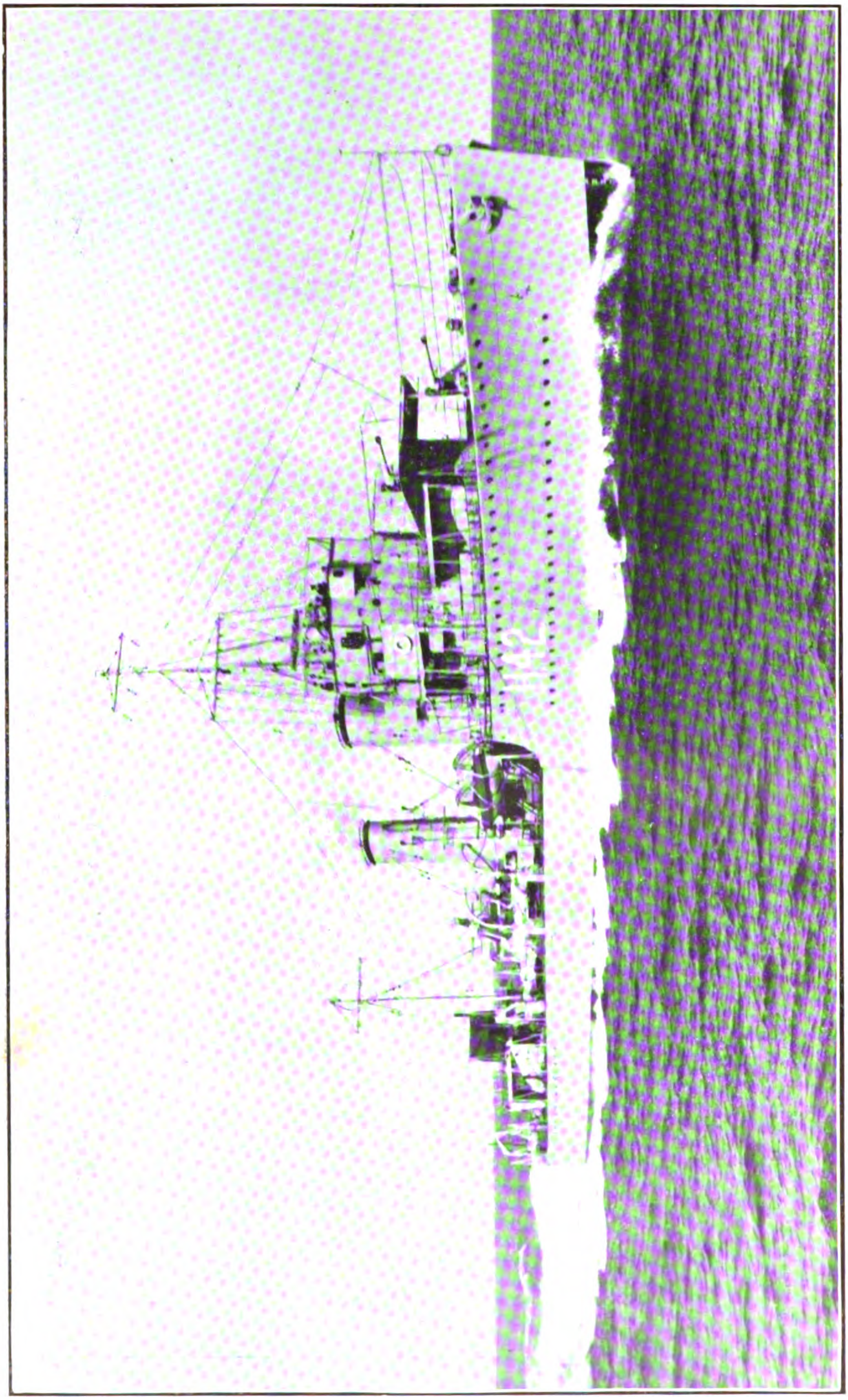

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PREFACE.

THE 1930 issue of "Brassey's Naval and Shipping Annual" appeared opportunely on the eve of the Five-power Conference on the Limitation of Naval Armaments. The 1931 issue reviews the work of that Conference in its proper perspective, and indicates some of the problems with which the future is beset. The keynote of the Conference was that it was not an isolated event—that it must be regarded as a beginning rather than an end in itself. In fact, after the signing of the London Treaty, the Conference was not concluded, but merely adjourned in order to give time for further negotiations between the French and Italian Governments. The hope then expressed that more time would lead to a settlement of the difficulties which had prevented a complete agreement between all five Powers represented at the Conference had not materialised at the end of the year. In view of Article 21 of the Treaty, which has been referred to as the escalator clause, even the three-Power agreement must be said to rest on an unstable foundation. A note of warning in this respect was discernible in the Prime Minister's review of foreign affairs at the Guildhall Banquet on November 10, 1930, when he said that "a good example must be the ingredient in every agreement, but that example must be followed by other States. The old Adam is still rampant. Words are used which make us doubt how much the world has learned by its sad and bitter experiences from 1914 to 1918. This country, while perfectly prepared to lead the way, looks behind at the same time that it looks before it, and wants to know what other nations are following it, because it cannot allow itself to be isolated in the risks that it is taking to secure peace." The significance of the Prime Minister's words will be emphasised by a study of the facts and figures presented in the present volume.

Several novel features will be found in this issue of the "Annual," in both the Naval and the Merchant Shipping Sections. In the former, for the first time for many years, a personal note is introduced by the inclusion of a chapter on the Navy Medical Service as a profession. The writer, Surgeon Rear-Admiral C. Marsh Beadnell, is able to illustrate the subject from his own experience of thirty years in the Royal Navy as a doctor, and much of what he writes on the amenities of a naval career applies with equal force to service in other branches.

Following the chapters by French, Italian, and Spanish naval officers, which created much attention in the " Annual " of 1930, a German naval officer, for the first time since the War, deals in this issue with the post-War development of the Navy of the German Republic. It is a pleasure to acknowledge the courtesy of the German naval authorities in permitting this chapter to be written. In view of the interesting situation created in the United States by the ratification of the Treaty by Congress, a contribution by Lieutenant Charles Godwin Moore, U.S.N., of the Naval Intelligence Department at Washington, is particularly welcome.

Three writers of recognised standing deal with the implications and incidence of the Naval Treaty from the British standpoint. The late Director of Naval Construction, Sir William Berry, considers its effect upon the design of capital ships and cruisers ; Lieutenant-Commander A. Colquhoun Bell, of the Historical Section of the Committee of Imperial Defence, discusses the entirely new strategical problem which has arisen ; and Captain A. C. Dewar, Head of the Historical Section at the Admiralty, explains the significance of the pact in international relationships.

In view of the growing importance of metallurgical science in all that appertains to the new material of shipping and aircraft, both naval and mercantile, Sir Robert Hadfield's essay is opportune. The past year has again been notable for progress in marine aircraft. Two new writers supply chapters on the naval and mercantile aspects of this subject respectively, " Phœnix " dealing with the organisation and development of the Fleet Air Arm, of which he has exceptional and intimate knowledge and experience ; and the Editor of " Flight " with commercial marine aircraft, in place of Mr. C. G. Colebrook, the Aeronautical Correspondent of *The Times*, whose untimely death we deplore. The three opening chapters, on British and Foreign Navies and Comparative Strength, are by the same contributors as for some time past.

The past year has been a time of anxiety in both the shipowning and shipbuilding industries. The former has felt the effect of various influences and adverse movements, of which the general world depression is only one, and the latter has been short of work and facing the difficulties of rationalisation, which has involved the closing down of several yards. Expert and trustworthy comment upon some of the questions and problems of the day will be found in the articles in the Merchant Shipping Section. Two chapters in the Section will be recognised as of a novel character, one describing the development of the ocean tourist business, and the other the amenities of the liner as an hotel; both will, it is hoped, prove useful to present or potential passengers, whether on business or pleasure. Sir Charles Sanders supplements his informative article in the 1930 " Annual " on the load lines of ships with a record of and commentary upon the work of the first International Load Line Convention. An exhaustive article upon wireless position finding, by Mr. R. A. Watson Watt, of the Radio Research Station, Slough, will be read with interest by a large number who, even though they may not go to sea or be directly connected with shipping, will be glad to have an authoritative exposition of the achievements of wireless in this sphere.

A new series on the great shipping companies opens appropriately with a chapter on the P. and O. Line; and the series on British ports is continued by Mr. R. W. Johnson with a description of the facilities of the Tyne. Following the article on the merchant fleet of Japan in the last " Annual," Captain Giuseppe Fortini now writes upon the Italian Merchant Marine, by special permission of the Italian authorities, whose co-operation is gratefully acknowledged. Three former contributors to the volume, Mr. J. P. Taylor, Mr. Cuthbert Maughan, and Mr. R. J. Butler, are again responsible for articles on subjects on which they are recognised authorities, and there is the customary chapter on notable merchant ships of the year.

The Reference Sections of the volume have been revised and amplified along the lines which past experience has shown to be most desirable. Mr. H. H. Palmer, R.C.N.C., has again given his able assistance in this respect, particularly in the revision of the tables and plans of warships. Among the photographic illustrations will be found a number of the latest war and mercantile vessels in all countries.

It is again a pleasure to acknowledge the courtesy and ready help of many authorities and correspondents all over the world, and we wish to express our grateful thanks for the cordial assistance afforded by our own and foreign Governments, the Naval Attachés of various countries in London, and many shipping and shipbuilding firms and institutions. Without this, " Brassey " could not hope to maintain the position it has held for nearly half a century as the leading exponent of professional thought and the principal reference work in regard to maritime affairs.

THE EDITORS.

December, 1930.

SUMMARY OF CONTENTS.

CHAPTER I. deals in accordance with custom with the progress of the Naval Forces of the British Empire during 1930. Retrenchment is again the keynote. The completion of the cruisers Norfolk and Dorsetshire achieves the total of 10,000-ton 8-in. cruisers allowed to Great Britain under the London Treaty. The construction of the smaller class of 7,000-ton 6-in. cruisers is being put in hand very slowly; only one ship, the Leander, is yet on the stocks, but orders were provisionally placed in December, 1930, for the Neptune, Orion, and Achilles, and other units of the 1930 programme. Technical progress continues, and an interesting event was the launch of the Acheron, the first destroyer to be fitted with high-pressure steam machinery. Investigation is proceeding into questions connected with the entry and education of naval officers. The work of the Australian Navy was hampered by the over-riding necessity for economy, but other Dominion Forces made good progress, and the year was marked by the launch of two new destroyers for Canada and the completion of the first sloop for the Royal Indian Marine since its reorganisation.

The review of Foreign Navies is again contributed by Captain Edward Altham, C.B., who argues that in view of the manner in which the London Treaty ties the British Empire until 1936, the expansion of the navies of foreign Powers who have not subscribed to Part III. of this Treaty must be a matter of grave concern to our naval authorities. A significant feature of United States and Japanese naval progress is the attention given to aircraft; the former is to have over 1,000 machines in 1931, and the latter has completed a new flying station and a new non-rigid airship. Details of developments in French naval construction, particularly in regard to the armour of cruisers and the speed and power of flotilla leaders, are given prominence, as is the progress, perhaps even more remarkable, in Italian shipyards. Germany, Spain, and several minor Powers have also improved their navies since the last issue of the "Annual," and the Nationalist Government in China has an ambitious scheme of development.

Dealing with the comparative strength and distribution of fleets, Mr. G. H. Hurford shows that while battleship strength is being scaled down under the London Treaty, the construction of capital ships is only postponed, for replacements will sooner or later become inevitable. In this matter, British action must depend on what is done by others. The only vessel now building classified as a battleship is the German Ersatz-Preussen, a new departure in design which must vitally influence construction in other countries. As regards British cruiser strength and the much-discussed reduction to 50 ships, the weakness in having one-half of the total made up of vessels of pre-war design, small, weak and unsuitable for general post-war service, is emphasised, and it is also shown how new construction lags far behind the prospective wastage.

In Chapter IV., Captain Alfred C. Dewar, O.B.E., R.N., Head of the Historical Section at the Admiralty, continues the erudite examination of the negotiations for the limitation of naval armaments which he has made in past issues of the " Annual." Dealing with the London Naval Treaty, he not only summarises its main provisions, but applies them to the existing material of the navies concerned, and shows what the new building programmes are likely to be. The aloofness of France and Italy from Part III. of the Treaty he considers to be its principal shortcoming; but that, by partly eliminating the factor of competition in armaments from the field of international relationships, the Treaty has attained a measure of success.

The Treaty negotiations and certain comments upon them led to a feeling that the United States wants a big fleet in order to overawe the rest of the world and crush opposition to her interests, commercial or otherwise. In a chapter on American Naval Policy, Lieutenant C. G. Moore, U.S.N., protests that such a view is entirely fallacious. The American people, as Senator Robinson said while in London as a delegate to the Conference, " realise that permanent peace is inseparable from confidence in security." Lieutenant Moore claims that a parity navy is essential to that security. In one century America has grown from a trackless wilderness to a great importing and exporting nation. She owes it to her people to have a navy equal to the most powerful if only in order to insure protection to her extensive foreign commerce.

For the first time since the War, the " Annual " welcomes a contribution from an officer of the German Navy. Lieutenant-Commander von Baumbach describes how the new German Fleet is being built under the restrictions imposed by the Treaty of Versailles, and he indicates the influences which led to the evolution of the " Ersatz-Preussen " type, vessels which " are perhaps the successors of the disappearing great battleship, in that they are capable of performing all the duties of capital ships." His account of the organisation of the Navy, its dockyards and shore stations, and its professional personnel which has replaced the short-service conscripts, is particularly interesting at the present time. He concludes his chapter with details of the replacement programme and the new designs of ships.

The signing of the London Naval Treaty has had a profound influence on the work of the naval architect. In Chapter VII., Sir William Berry, late Director of Naval Construction, discusses the effect upon the designs of ships. He points out a weakness of the 10,000-ton cruiser type; the insufficiency of protection afforded, particularly on the sides and above-water decks amidships. A well-placed 8-in. salvo would place the ship receiving it out of action. Sir William thinks it possible that experience will show that some reduction in designed speed and radius of action is acceptable, and explains how better protection could then be given. As regards the new 6-in. cruisers, if a somewhat lower speed than that of the 10,000-ton vessels was accepted, they could be adequately protected against the 6-in. gun without unduly increasing displacement, which he puts at something between 6,500 and 7,500 tons; and their cost is estimated at from three-quarters to one-half a million pounds less than that of the 10,000-ton class.

An important question is raised, and a new problem presented, by Lieutenant-Commander Bell in his chapter on "The Meaning of a One-Power Standard." He recalls the passing of the pre-War two-power standard, which implied a naval force capable of defeating, in battle, the strongest naval coalition that could be formed against us in Europe. To measure how far such a standard was being maintained was easy with the aid of comparative tables of battleships and guns. The advent of submarine warfare on commerce has changed the character of naval operations. It makes more complicated the calculation of the forces necessary for protection against the probable force which might be brought to attack British commerce, both above and below water. Instead of measuring naval strength in terms of fleet actions, regard must be paid to the forces necessary to convoy trade; and to provide patrol, escort, mining, and hunting flotillas, as well as a Grand Fleet to support the whole.

One of the few notes of anxiety in the First Lord's speech on the Navy Estimates on March 17, 1930, concerned the scarcity of medical officers. In Chapter IX., Surgeon Rear-Admiral C. Marsh Beadnell replies to the question of what are the prospects in the Navy Medical Service as a profession. He touches upon certain grievances, notably that medical officers are not the final arbiters in their own department; that they are only in charge, and not in command. Against these he sets the advantages of a naval career, with its opportunities for travel and service in company with congenial companions.

Sir Robert Hadfield, head of the great steel firm bearing his name, gives an account in Chapter X. of the part played by the metallurgist in the development of marine engineering and construction. Some of the benefits which are being derived by marine engineers from the use of alloy steels are described, but it is to the question of armour that metallurgical science has been applied to a greater extent probably than to any other connected with ships of war. Heat-resisting steels for valves, which have been necessitated by the high temperature of the exhaust gases in internal combustion engines, are also among the topics dealt with in this chapter.

The Fleet Air Arm, which has been organised on existing lines for seven years now, is dealt with in the last chapter of the Naval Section. Its history and organisation are traced from pre-War days through the various changes to the present force under the dual control of Admiralty and Air Ministry, with 70 per cent. of the pilots and all the observers and telegraphists naval ratings. Training and conditions of service are described, and the prospect for the employment of aircraft in future naval operations is discussed. Some of the problems confronting those responsible for naval air work are touched upon, notably that of the exact navigation of these high-speed aircraft over a surface which is featureless, through an element composed of winds which may vary in direction and strength at different heights and in adjacent localities. Useful appendices contain further figures and information concerning the Fleet Air Arm.

THE SHIPPING SECTION.

The standing of the world's merchant fleets is again reviewed by Mr. John P. Taylor. Comparing the percentage of tonnage owned by the principal countries in 1898 and in 1930, he points out that whereas the steam tonnage of Great Britain and Ireland was then 54 per cent. and is now less than 30, while that of the United States has risen from 3·8 to 15·7 per cent., at the same time the large American fleet is something of a wasting asset. While 23 per cent. of British-owned tonnage is less than five years old—the only countries with a larger proportion being Norway and Holland—France, Japan, and Spain have only between 11 and 13 per cent., and the United States only 4·1 per cent. A further increase in motorship tonnage is observed, and the continued transition from coal to oil forms the subject of one of the tables to the article.

Mr. Cuthbert Maughan again deals with questions concerning the freight markets. His chapter is aptly termed "The Speculative Character of Shipping," for while on first thoughts a reasonable measure of permanence might be expected in the arrangements for the feeding of the nations, experience shows much variation. The very fine summer in Europe in 1929 meant better grain harvests, with consequent less need for imports and for the use of shipping. Illustrations are cited of low rates of freight, and the position in 1930 was probably more depressed than at any time in the annals of shipping—an aftermath of the War. On the question of the sale to foreign owners of old tonnage which competes with British shipping, a Government Committee has been set up, but the general view is that remedial measures can best be taken by the industry itself.

A new and more personal note is struck by Chapters XIV. and XV., dealing respectively with the ocean tourist business and with the liner as an hotel. In developing the tourist business, special ships have been built, and their equipment and amenities are briefly described. The keen competition for business has led to the world being scoured by the tourist agencies for novelty, and cruises to the lonely island of Tristan da Cunha and even more remote places are becoming commonplace. The companies concerned have undoubtedly stimulated the desire to travel afloat; everything possible is done for the comfort and amusement of passengers; and altogether the magnitude of the post-War tourist traffic stands out as a remarkable effort to create new business.

Dealing with the liner as an hotel, the writer of Chapter XV. voices the feeling of many voyagers that the elaboration in the standard of accommodation now offered takes away the feeling that one is on board ship. In the old days, cabins and public rooms were so radically different from bedrooms and public rooms on shore that an immediate sense of anticipation was aroused when foot was set on board ship. Now the accommodation and furnishing are on a scale to meet the most exacting tastes. Dining facilities rival those to be obtained in the best hotels on shore. There are swimming baths and gymnasiums, barbers' shops and beauty parlours, ballrooms and smoking-rooms, tennis courts and well-stocked libraries. Never were the amenities of ocean travel so numerous and varied.

On the important question of the load lines of merchant ships Sir Charles Sanders, who wrote on this subject in the last issue of the "Annual," and who was Chairman of the Load Line Committee of 1927, describes the scope and provisions of the first International Load Line Convention which has resulted from the Conference of 1930 held in London. The measure, subject to ratification by the contracting governments, comes into force on July 1, 1932, and the summary of its provisions affords an indication of its comprehensive character. "It lays down," says Sir Charles Sanders, "higher and more precise standards for the assignment of load lines than have ever existed before, and at the same time it provides machinery for international administration . . . it will do much to ensure uniformity in the loading limits of ships in all the ports of the world, and to increase the safety of life and property at sea." Already the United States Government has adopted its principles and rules.

Beginning the new feature descriptive of the principal shipping lines, Chapter XVII. deals with the P. and O. Steam Navigation Company. The writer recalls that the British East India Company in 1798 established the first regular monthly mail service between Bombay and England, and in 1829 rules were made for conveying mails in the Company's steamers to Suez, and thence across the Isthmus to Alexandria, and by sea to Europe. The P. and O. Company was constituted in 1837 to carry mails between Falmouth and Gibraltar, with calls at Vigo, Oporto, Lisbon, and Cadiz. By the time its charter of 1840 was granted, it had extended its services to Malta and Alexandria, and so paved the way for the later trade to India and Australia. The effect of the opening of the Suez Canal in 1870 is shown, with other notable developments down to the schemes of post-War reconstruction and amalgamation.

A chapter on the Port of Tyne gives credit to the bold scheme of the Tyne Improvement Commission, carried out over many years, which has turned a tortuous, shallow stream into the great outlet for Northumberland and Durham coal. When in the fifties of last century, rail-borne coal from Yorkshire threatened the Tyne's trade in sea-borne coal with London, Sir Charles Mark Palmer built the first screw collier, and therewith, at a stroke, saved the North Country coal trade and established iron shipbuilding as a permanent industry on Tyneside. Facilities for shipbuilding and ship repairing are reviewed, and it is noted that no prejudice in favour of coal has prevented the river from extending its bunkering facilities to oil. A future development scheme for Jarrow Slake has hopeful prospects, with Government co-operation.

An Italian officer, Captain Giuseppe Fortini, deals with the progress of the Merchant Marine of his country. After an historical survey down to the great slump of 1922, he shows how Italy has risen again, after a fall, on the solid foundation of the Roman virtues of order and discipline. The mercantile tonnage figures increased by 20·86 per cent. between 1922 and 1930, and show an increase of 128 per cent. over 1914. The Government schemes of assistance to capital are described and discussed. It is recalled that in a recent speech the Duce reaffirmed his belief that the only "healthy industries" are those which "find their work in agriculture and on the sea." Captain Fortini points out that the only resource left open to Italy without let or hindrance and full of possibility is the sea.

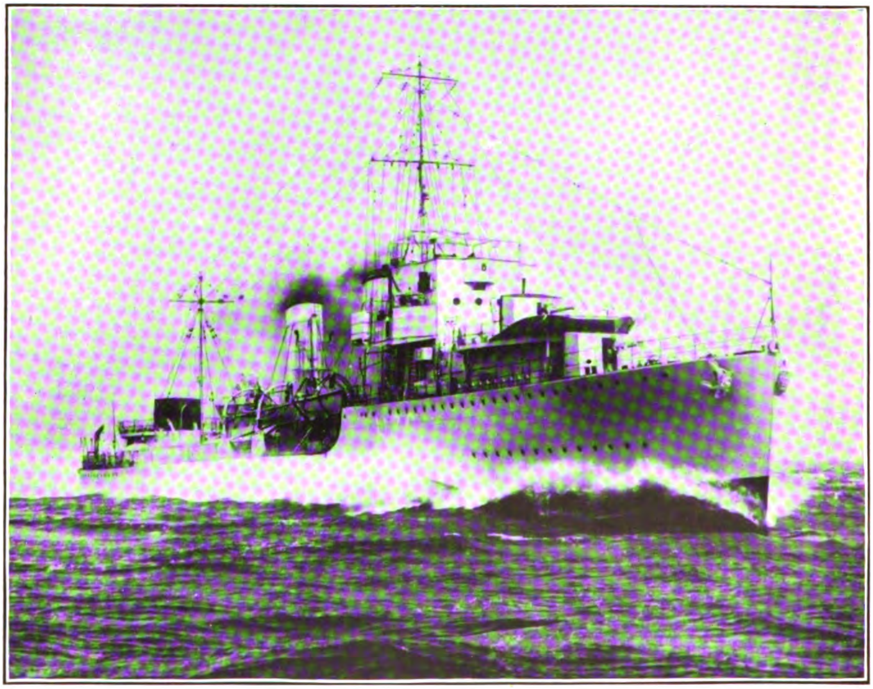
Mr. R. J. Butler, M.I.N.A., again writes on Mercantile Marine machinery in Chapter XX. He records the extent to which high-pressure steam installations have been adopted. As regards electrical propulsion, many owners remain unconverted, and neither Italy nor Germany has yet adopted the electric drive for any vessel of importance. Exhaust steam turbines, coal-burning equipments, and internal combustion engines are also dealt with, and a useful tabular statement has been prepared showing the methods of propulsion favoured for the various types of vessel. The writer points out that the engineering profession is practically the only one in which the present generation has had to learn its trade three times—first with reciprocators, then with turbines, and last with Diesels. A note of warning is sounded regarding the lack of apprentices in engineering.

The customary chapter on Notable Merchant Ships of the Year refers to the Norddeutscher Lloyd liners Bremen and Europa, and to various geared motorships. An important ship of the year is the Empress of Britain, launched on June 11 at Clydebank for Canadian Pacific Steamships, Limited; she will be by far the largest in the Canadian passenger trade. A number of new vessels passed into service during 1930 are briefly described and their notable features appraised. Of special interest is the 20,000-ton whaling factory motorship Sir James Clark Ross delivered by the Furness Shipbuilding Company. This is the first occasion on which Diesel engines have been employed for a large whaling factory.

An informative article has been written by Mr. R. A. Watson Watt, of the Radio Research Station, on "Wireless Position Finding," and is accompanied by illustrations. As a result of his survey, the writer holds very strongly to the opinion that the immediate future of direction-finding lies with the Adcock system in its various applications. The article is the most exhaustive yet published in the "Annual" on this important subject.

The growing importance of commercial marine aircraft is reflected in a chapter on this matter by the Editor of "Flight." He considers we are now on the eve of another very important stage in the evolution of the large flying boat, again as a result of the metallurgist's art—the adoption of rustless steel, in place of aluminium alloy. Various types of flying-boats produced by such firms as the Blackburn Company, Messrs. Saunders-Roe, Messrs. Short Brothers, and the Supermarine Aviation Works are described.

NAVAL SECTION.



H.M. DESTROYER ANTELOPE, 1,330 TONS.

Commissioned at Portsmouth, April 10, 1930.

(*By courtesy of the builders, R. and W. Hawthorn, Leslie and Co., Ltd., Newcastle-on-Tyne.*

CHAPTER I.

NAVAL FORCES OF THE BRITISH EMPIRE.

THE ratification of the London Naval Treaty by the three principal Powers has not immediately affected the strength of the Fleets concerned, and some little time must elapse before its provisions become operative. As they do so, the relative position of the British Empire's naval forces must decline, for the simple reason that the amount of construction allowed to other Powers will enable them to have in their Fleets a higher proportion of new tonnage than that in the Royal Navy. The situation is contingent to a certain extent upon what is done by France and Italy. At the time of writing, not only were they outside the pact, but signs of their coming in appeared to be more remote than ever. The Treaty, therefore, like all others of its kind, looks like being an instrument of doubtful value to this country. It may have results unexpected by its promoters, in the same way that the Washington Treaty, while leading to reductions in capital ships, was the starting point for the building of a new class of 8-inch gun cruisers not at all well suited to the needs of the Powers who were obliged to construct them. Politically, the Conference is held by many to have been a success by reason of the amicable agreement come to between the three leading Powers covering all classes of vessels. For the sake of this ideal, naval objections have for the time being been overruled.

The close of 1930 found the Royal Navy in a condition not altogether satisfactory to those who believe that the Fleet is still the main bulwark of our security. Less money is being spent upon it; there are fewer new ships in hand; replacements are not being provided for as they become due; necessary works are being deferred; training suffers because fewer ships are in commission; the consumption of fuel and ammunition is limited more rigidly; and the numbers of the personnel are being reduced to a lower total than for 34 years. The significance of the reductions, which have now been going on for ten years, in the peace establishment is not yet realised by the people as a whole. The Prime Minister has observed that "Britain's Navy is Britain herself. We are a people of the sea, and the sea is our security and our safety." Unfortunately, as Vice-Admiral W. H. D. Boyle, C.B., remarked in an address on January 3, 1930, to the members of the Historical Association, "the truth of that was not universally recognised, a fact that might prove a source of danger at the present time. Many educated people failed to recognise that diplomatic successes and military triumphs had only been possible because of our sea power and because of the riches which the possession of sea power had enabled us to amass."

One outcome of the Naval Conference and of the Treaty to which it gave rise must be then a feeling of anxiety as to the future state of the Navy. It is felt that if the reductions go on, and are unaccompanied by corresponding cuts abroad, but on the contrary are met by new developments in building, alarm will be engendered, which may culminate in a panic. The resultant efforts would be wasteful and far less satisfactory than if construction and design proceeded steadily and regularly. Such panics have happened before after a prolonged period of retrenchment, and are to be deprecated on all grounds, but in the present wave of pacifism and enthusiasm for conferences little regard is paid to the teaching of history. Economy, both at home and overseas, has become vitally necessary, and as in times past the defence forces are the first and the easiest things to cut down. This is to be done for a time with impunity, but a change in the international situation may completely alter the position, and the problem then to be faced is what will be the condition of affairs when there is a call for more ships and the resources which were formerly relied upon to produce them have largely disappeared with the closing down of private yards and the dispersal of skilled labour.

SOME VIEWS ON THE SITUATION.

It may be well to place on record some of the opinions expressed on the results of the London Treaty in their bearing upon the strength of the Royal Navy. They illustrate the feeling of uneasiness aroused by the course of events. In a debate on the Treaty in the House of Lords on May 8, 1930, Lord Carson, who was First Lord of the Admiralty in 1916–17, said :

> There are two questions which arose in my time, on each of which I will say a word in a moment, and which go absolutely to the root of the existence of this country. One is the question of the food of our people, and the other is the question of defence from invasion. I would like to know, and we have a right to know, who are the experts who have advised the Government that this Treaty, as it is at present before the House, will ensure to this country, in eventualities that may arise, a proper supply of food for the existence of our people and a proper defence in the event of an attempt at invasion ? . . . When you are considering the number of ships which are to enable you to supply the country with food, supposing our ports are all protected from the entry of ships by the laying of mines, and you lose cruiser after cruiser, or destroyer after destroyer, or ship after ship of any kind, in your attempt to convoy, what has that got to do with America or with the problem before America ?

In the same debate, Lord Jellicoe declared that " the reductions that are now proposed go beyond the limit of security," and that the post-war naval conferences had effected reductions in our own Navy, but had not done so in any other Navy in the world, except that the Washington Treaty resulted in the reduction of a certain number of American battleships. Lord Wester Wemyss, who like

Lord Jellicoe had experience as First Sea Lord during the late War, also said in the debate on May 8:

> Of the five Powers that entered into this Conference we appear to be the only one who had no fixed ideas as to what the real strength of our defensive forces should be. The consequence was that we have given up largely—not only large numbers, but numbers greatly superior to what we should have done in the opinion of most people, to get—what? As far as I can see, nothing. For, certainly what the Conference did not succeed in doing, and what it set out to do, was to put a limitation to naval armaments.

In a speech at Weymouth on May 2, 1930, Viscount Bridgeman, late First Lord of the Admiralty, said that he very much regretted the London agreement, partly because it did very little in the direction of economy, gave away the most important part of our Fleet, and obtained practically nothing in return. Referring to the reduction in cruiser strength from 70 to 50, Lord Bridgeman said:

> Our naval experts and advisers had always said 70. A lot of questions had been asked in Parliament about it, and evasive replies had always been given. The usual answer was that the Government took the responsibility. If that meant anything, it meant that they had acted against the advice of their Sea Lords. If we are going to make this enormous surrender against the advice of all the best naval experts in this country, and if it is necessary in the interests of economy, surely they might have got something out of some of the other countries equivalent to the surrender which we are making.

A week later, on May 15, there was a debate on the Treaty in the House of Commons. Mr. Churchill made three submissions to the House in respect of the Treaty and its influence on the Royal Navy. He said:

> The first is that the Agreement of London is not the natural successor or child of the Washington Agreement of 1921, but, on the contrary, differs fundamentally from it. That is my first submission. My second is that it is not a Treaty of parity at all in the sense that Great Britain and the United States should be equal Powers upon the sea, but that, on the contrary, it is a formal acceptance by Great Britain of definitely inferior sea-power. Thirdly, I submit that the London agreement contains within itself subsidiary provisions which will have the effect of ensuring that that inferiority is attained before the Treaty comes to be revised in 1936.

Mr. Amery, another ex-First Lord, made among others the following point in the debate on May 15, 1930:—

> If we deduct the 25 cruisers required for the battle fleet, and cruisers that will be in dock for repairs at any one time, the position is that we shall not have a dozen fit cruisers to control 80,000 miles of sea routes. That is a profoundly unsatisfactory situation.

As late as November 5, 1930, *The Times*, in a leading article on the opening of the Preparatory Commission for the Disarmament Conference at Geneva, thus expressed the views widely held on the general situation:

> The Preparatory Commission for Disarmament, which has been convoked at Geneva to-morrow for what is hoped will be its last session, can hardly be said to be meeting at a propitious moment. Everywhere there are signs of political unrest and military preparedness; extravagant threats are uttered by one nation against another; the mutual trust which can alone produce spontaneous reduction of armaments is—outwardly at any rate—conspicuous by its absence. Every one of the greater Powers except Great Britain and Japan is spending more on

its defences than it was in 1924, the year in which the process of sloughing off the panoply of active war may be said to have been completed. Not only France, Italy, and Germany, but the United States of America and Soviet Russia to-day make a larger total annual outlay upon their naval, military, and air forces than six years ago. The one conspicuous success in the limitation of naval strengths recently achieved in London is partly offset by the continued failure of France and Italy to become full partners in that agreement; and there is reason to believe that the French Government is now contemplating the construction of a new type of battleship which would embody on a larger scale most of those ingenious devices of naval architecture which have made the German "pocket battleships" the most formidable vessels afloat of their size.

I.—THE BRITISH NAVY.

THE NEED FOR BATTLESHIPS.

Although no battleship construction has been in progress in this country since the completion of the Nelson and Rodney in 1927, the question of the building of such vessels is not finally settled, but is merely deferred for another five years under the London Treaty. It is still recognised in all countries that a battle fleet supplies the backbone of a first-class navy, and gives not only effective but indispensable support to the cruiser squadrons. This important fact must not be lost sight of, for it has not been suggested that any other type of vessel will fulfil the duty of a battleship. It is certain that in due course a further demand for vessels of this class must arise. Financial and political reasons against their construction are bound to be advanced, but it is unlikely that professional and technical opinion on such an important matter can be entirely stifled. At the London Conference, the British Government pressed for reductions in battleship strength without disturbing the Washington equilibrium. The Admiralty informed the Government that they would favour a reduction in size from 35,000 tons to 25,000 tons, and of guns from 16 inch to 12 inch, together with a lengthening of the age from 20 to 26 years. These views did not commend themselves to the Conference, which in itself is an indication that there is still faith in the power and importance of ships of the largest class.

THE 1926 CRUISER PROGRAMME.

The three cruisers authorised in 1926 were passed into service during 1930. One of them was the first of the smaller or "B" type cruisers, H.M.S. York, which was built by the Palmers' Shipbuilding and Iron Company, Jarrow. She was laid down in May, 1927, launched on July 17, 1928, by the Duchess of York, and was commissioned at Chatham on May 6, 1930, for service in the Second Cruiser Squadron in place of the Canterbury. On April 29, 1930, the ship was presented at Jarrow on behalf of the City of York with a silver ewer and rose bowl. These pieces are replicas of seventeenth century plate presented to the city, and the only other replicas were given to the Duke and Duchess of York on their wedding. The York was commissioned by Captain W. N. Custance, formerly commanding the Yarmouth.

The two "A" class in the 1926 programme were the Norfolk and the Dorsetshire. The former was laid down by the Fairfield Shipbuilding and Engineering Company at Govan in July, 1927, and launched on December 12, 1928. She was commissioned on May 14, 1930, by Captain C. B. Prickett (who has special associations with East Anglia), and relieved the Comus in the Second Cruiser Squadron. The Dorsetshire was allotted to Portsmouth Dockyard, where she was laid down in September, 1927, and launched on January 29, 1929. She was commissioned for trials on June 24, 1930, and completed for service on September 16 to relieve the Frobisher in the Second Cruiser Squadron.

The design of the Norfolk and Dorsetshire is similar to that of the "London" class of the 1925 programme. Both groups were designed by Sir William J. Berry, K.C.B. On the maximum displacement of 10,000 tons allowed by the Washington Treaty, they carry eight 8-inch guns at a speed of 32¼ knots. Contemporary cruisers in the United States and Japanese Navies are more heavily armed, without loss of speed, but whether they are as well protected or have the same enduring mobility seems doubtful. The Pensacola and Salt Lake City have ten 8-inch guns, mounted in two triple and two twin turrets, but this number is reduced to nine in the Northampton and later cruisers. The Japanese ships of the "Myoko" type have ten 8-inch guns, twin mounted. As under the London Treaty the number of 8-inch cruisers in the British Navy is limited to 15, the Norfolk and Dorsetshire will be the last of their type which can be built up to 1936.

CRUISERS OF LATER PROGRAMMES.

The three cruisers originally proposed under the 1927 Estimates were reduced to one. This ship is the Exeter, laid down at Devonport Dockyard in August, 1928, launched on July 18, 1929, and due for completion in 1931. She is to replace the Hawkins in the Second Cruiser Squadron, Atlantic Fleet.

The 1928 schedule originally included one "A" class and two "B" class cruisers, but was modified in January, 1928, to two "A" class cruisers, the Surrey and Northumberland, to be built at Portsmouth and Devonport respectively. On July 24, 1929, Mr. MacDonald announced in the House of Commons the suspension of work on these ships, and six months later it was notified in fleet orders that it had been decided that the construction of the ships was to be definitely cancelled.

The 1929 Navy Estimates, introduced by the Conservative Ministry, provided for one "A" class cruiser and two "B" class cruisers. On July 24, 1929, Mr. MacDonald announced that no steps would be taken to proceed with these ships until the matter had received further consideration. In reply to a question in Parliament on January 29, 1930, the First Lord of the Admiralty stated that the following vessels had been deleted from the 1929 programme:—Two cruisers (including the 8-inch gun ship), four destroyers, one net-layer and target-towing vessel, two sloops, and three submarines (a decision as to proceeding with the three remaining submarines being deferred until after the Naval Conference). This change left only one cruiser in the programme for the year, and in April, 1930, the name of Leander was chosen for this ship. It had already been decided that the "B" cruisers of this year should be of a new smaller type with 6-inch guns. The Leander was laid down at Devonport Dockyard on September 8, 1930, on the slip from which the Exeter had been launched over a year before. The reduction effected in cost by the Labour Government's alterations in the programmes of 1928 and 1929 was officially estimated at £12,000,000.

Under the Supplementary Navy Estimate, issued on July 9, 1930, authority was taken to build three 6-inch type cruisers. These will not be laid down until well into 1931.

CRUISER PROGRAMMES, 1926–30.

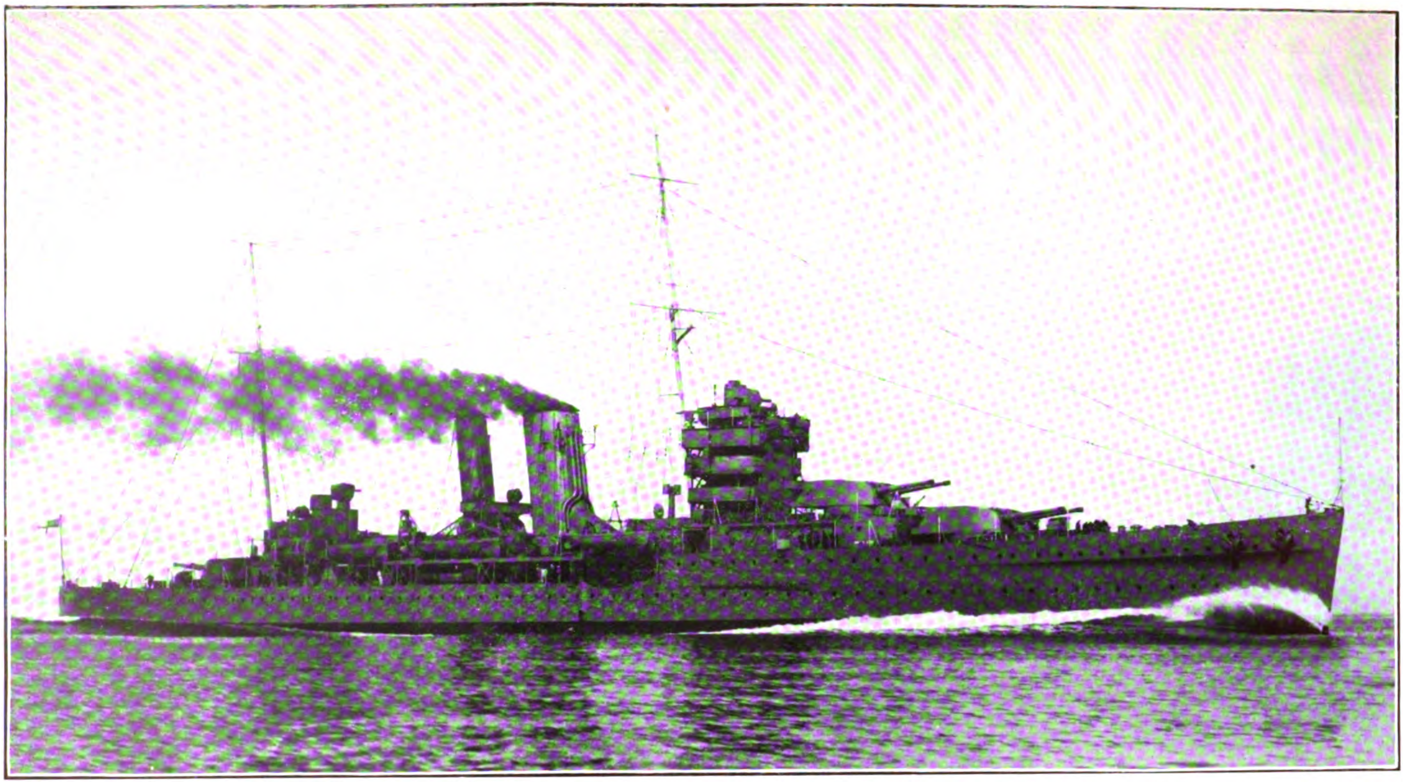
The following table summarises the position in regard to the construction of cruisers for the Royal Navy under the five programmes from 1926 to 1930 inclusive :—

Programme.	Ships.	Tons.	Begun.	Remarks.
1926	York Norfolk Dorsetshire	8,400 10,000 10,000	May, 1927 July, 1927 Sept. 1927	Completed, May, 1930 Completed, May, 1930 Completed, Sept. 1930
1927	Exeter	8,400	Aug. 1928	Due for completion, end June, 1931
1928	(*Surrey*) (*Nottingham*)	10,000	Ordered, 1929,	cancelled, January, 1930
1929	Leander	6,500	Sept. 1930	On the stocks
1930	3 ships	6,500	To be begun, 1931	

The question of the adequacy of these programmes, in view of the prospective wastage from ships becoming obsolete, is examined in the article on Comparative Naval Strength (Chapter III.).

DESTROYERS OF 1927 PROGRAMME.

Under the 1925 schedule of construction for replacement, one flotilla of destroyers (one leader and eight destroyers) was to be built each year, beginning under the 1927 Estimates. The 1927 flotilla were ordered by contract in the spring of 1928, and laid down between June and October of that year. They include the flotilla leader Codrington and eight destroyers of the "Acasta" class, and were launched at various dates between April 24, 1929, when the Anthony was launched from the yard of the Scotts' Shipbuilding Company, Greenock, and March 18, 1930, when the



[Photo by W. Parry and Son, South Shields.

H.M. CRUISER YORK, 8,400 TONS.

Commissioned at Chatham, May 6, 1930.

(By courtesy of the builders, Palmers Shipbuilding and Iron Company, Ltd., Jarrow-on-Tyne.)

Acheron, of a special type from the others, was put afloat at the Woolston yard of Messrs. Thornycroft. This flotilla was allocated to the Mediterranean Fleet to form the new Third Flotilla, in relief of the Keppel and destroyers of the " W " class. The Codrington was completed on June 4, 1930. The first seven destroyers were completed between February 14 and April 14, 1930, leaving the Acheron to be finished about November.

THE ACHERON: HIGH PRESSURE STEAM.

The Acheron is the first destroyer to be fitted with special machinery designed to make use of high-pressure steam. She is designed by Sir William Berry, and her dimensions are similar to the rest of the " A " class (1,330 tons displacement, 312 ft. long, engines of 34,000 s.h.p., speed 35 knots, and armament, four 4·7-inch, seven smaller guns, and eight torpedo tubes). At the launch of the Acheron on March 18, 1930, Sir John Thornycroft, after referring to the part Sir Charles Parsons had played in revolutionising the method of steam propulsion in ships, said that Sir Charles had persuaded the Admiralty to build a destroyer having machinery of a much higher pressure than any other, with a view to showing the great economy which could be obtained. It was obvious that if the Navy was to be cut down each unit must be of the greatest possible efficiency. H.M.S. Acheron was really Sir Charles Parsons's firm's vessel, although the Thornycroft firm had been entrusted with the building of the hull. Sir Charles Parsons, who was also present at the launch, said that the advantage of high pressure was that they obtained a greater percentage of power from a given amount of fuel. This ship should be 10 or 15 per cent. more economical than her sister vessels with half her boiler pressure. He hoped that in time we should get high pressure in all warships and in the Mercantile Marine as well. That would lead to an increase in efficiency which would bring consumption down to ½ lb. of fuel per horse-power, or almost the same as the Diesel engine.

DESTROYERS OF 1928.

The flotilla authorised under the 1928 Estimates was ordered in the spring of 1929. It consists of the leader Keith and eight destroyers of the " Beagle " class. The adoption of a new and smaller design for the flotilla leader has decreased the cost, and the Keith is expected to be built for £278,092, as compared with the £320,008 spent upon the Codrington. The feature of the design of the Keith is that her displacement of 1,330 tons is the same as that of the destroyers with which she will work, and she will have one 4·7-inch gun less. Earlier flotilla leaders were heavier than the destroyers with which they worked, in order to provide for extra armament as well as extra accommodation. Thus the Codrington is of 1,520 tons, and carries five 4·7-inch guns, as compared with the 1,330 tons of the Acasta, with her four 4·7-inch guns. In the Keith, only three 4·7-inch guns are to be carried. The Keith is being built by Vickers-Armstrongs, Ltd., at Barrow, and engined by them. She was launched on July 10, 1930. Her length overall is 323 ft.; breadth, 32¼ ft.; and depth to the upper deck, 19 ft. The propelling machinery, also supplied by Vickers-Armstrongs, includes two sets of Parsons turbines, with single reduction gearing, each set comprising one high-pressure and one low-pressure turbine, working in series, giving a total shaft horse-power of 34,000. The designed speed is 35 knots, similar to that of the "Beagle" class destroyers. Steam is supplied by three Yarrow water-tube boilers, oil fired, fitted with superheaters, and designed for a working pressure of 300 lb. per square inch, and a superheat of 200 deg. F. under closed stokehold conditions.

The "Beagle" class destroyers are of the same tonnage and dimensions, horse-power and speed as the Keith, and differ only in their armament and accommodation. The Basilisk and Beagle were launched by John Brown & Co. at Clydebank on August 6 and September 26, 1930. The Blanche and Boadicea were launched by Hawthorn Leslie & Co. at Newcastle-on-Tyne on May 30 and September 23. The Boreas and Brazen were launched by the Palmers' Company at Jarrow-on-Tyne on June 11 and July 25; and the Brilliant by Swan Hunter and Wigham Richardson at Wallsend-on-Tyne on October 9. The Brilliant was launched with guns, engines, masts, funnels, and all auxiliaries on board, and even with smoke issuing from the funnels, the vessel being all ready to proceed to sea.

Destroyers of 1929.

In January, 1930, the destroyer programme of the 1929 Estimates was cut down from one leader and eight destroyers to one leader and four destroyers. The leader and two destroyers were allotted to be built by contract, but the other two destroyers were transferred from the contract-built list to be constructed at Portsmouth Dockyard, as some small compensation for the cancelling of the cruiser Surrey, which was to have been built there. Thus the private yards, instead of the eight destroyers expected, got only two. The flotilla leader will be called the Kempenfelt, and the destroyers will be known as the "Crusader" class. The Crusader and Comet will be built at Portsmouth Dockyard and the Cygnet and Crescent by contract. Orders were not placed for the contract ships until June, 1930, or about four months after the corresponding dates for those of the 1927 and 1928 programmes. Messrs. J. Samuel White & Co., East Cowes, received the order for the hull and machinery of the flotilla leader Kempenfelt. Messrs. Vickers-Armstrongs, Barrow-in-Furness, received the order for the hull and machinery of the destroyers Cygnet and Crescent. For the machinery of the Crusader and Comet, at Portsmouth Dockyard, Messrs. Hawthorn Leslie & Co. received the contract. The keels of these last two destroyers were laid down on September 12, 1930. Lady Keyes, wife of the Commander-in-Chief at Portsmouth, laid the keelplate of the Crusader; Mrs. Donaldson, wife of the Admiral-Superintendent, laid that of the Comet; and at the same time

Mrs. Bridges, wife of the Captain of the Vernon, laid the keel of the Nightingale, the new tender to the torpedo school, which is also being built under the same programme. The Nightingale has been designed by Mr. A. W. Johns, C.B., C.B.E., the new Director of Naval Construction.

The cutting down of the destroyer programme of 1929, purely on financial and political grounds, was singularly irrational. Destroyers normally work in flotillas of eight, and the production of only four in one year and eight in other years is like trying to produce half a ship. That there had been a definite arrangement for eight new destroyers annually is clear from the Admiralty announcement in the summer of 1929 of the order in which each of the four flotillas in the Mediterranean were to be reconstituted. The reduction since made means that there will be only a half flotilla coming into service in 1932, in which year the vessels of the First Flotilla were due to be replaced by new craft. After all, it is upon the maintenance of destroyer strength that we must chiefly rely for an answer to the submarine menace.

REPLACEMENT SLOOPS.

The replacement of sloops of war design by new vessels is proceeding, but has suffered, like that of the destroyers and submarines, by the retrenchment policy of the Government. The two authorised in 1927, the Bridgewater and Sandwich, are serving in China. Four were authorised in 1928, of which the Penzance and Hastings were allocated to Devonport Dockyard and the Folkestone and Scarborough to Swan, Hunter and Wigham Richardson, Ltd., Wallsend-on-Tyne, with machinery by Hawthorn Leslie & Co., Ltd., Hebburn-on-Tyne. The Hastings and Penzance were floated out of dock at Devonport on April 10, 1930, and were named respectively by the Hon. Alice Brand, sister of the Commander-in-Chief, and Mrs. Backhouse, wife of the Admiral-Superintendent. The Folkestone was launched on February 12, 1930, and the Scarborough on March 14, 1930, both without ceremony. They are similar to the "Bridgewater" class, and are of 1,040 tons, 2,000 horse-power, 16 to 16½ knots' speed, with geared turbines using oil fuel only, and an armament of one 4-inch gun, one 4-inch anti-aircraft gun, and four smaller guns. They were passed into service during the summer and autumn of 1930, the Hastings to relieve the Lupin, the Penzance to relieve the Cyclamen, and the Folkestone to relieve the Crocus, all in the Persian Gulf; and the Scarborough to relieve the Wistaria on the America and West Indies Station.

Six sloops were proposed under the 1929 Navy Estimates, but in January, 1930, the number was cut down to four. The names chosen were Shoreham, Fowey, Bideford and Rochester, and they will be known as the "Shoreham" class. Originally, it was proposed to build two sloops of this year in the dockyards and four by contract, but after the reductions in shipbuilding it was decided to build all the remaining four in the public yards at Chatham and Devonport. The Shoreham was laid down at Chatham in December, 1929, and launched on November 22, 1930. The Fowey was laid down at Devonport on March 24, 1930, and launched on November 4, 1930. The Bideford and Rochester are on the stocks.

There has been some suggestion that these vessels can take the place of cruisers on foreign stations. The futility of this proposal was demonstrated just before the War of 1914–18, when it became necessary to withdraw this class of vessel and use their crews for more effective ships. The more the sloops are tried in place of cruisers, the greater the chances of a repetition of such incidents as the massacre of the little Pegasus at Zanzibar.

SUBMARINES.

Of the six " O " class submarines authorised in 1926, four, the Odin, Osiris, Oswald, and Otus, left Portsmouth on May 24 for the China Station, and arrived at Hong Kong on August 9, 1930. The Olympus and Orpheus were retained in England for alterations.

During 1930 the six " P " class submarines, authorised in 1927, were completed, and the first four, Perseus, Pandora, Poseidon, and Proteus, all built by Vickers-Armstrongs, Ltd., were ordered to leave Portsmouth on December 12 and to arrive at Hong Kong on February 21, 1931.

Of the four submarines in the reduced programme of 1928 (from which the Rupert and Royalist were cancelled), the Regent was commissioned at Barrow-in-Furness on September 20, and the Regulus on November 1. Vessels of this programme will proceed to the Mediterranean on completion.

The six submarines originally proposed under the 1929 Estimates were suspended and finally reduced to three after the London Conference. The names chosen for these are: Swordfish and Sturgeon, to be built at Chatham Dockyard; and Thames, to be built by Vickers-Armstrongs, Ltd. The former two will be coastal submarines of 640 tons, and the Thames an ocean-going submarine of 1,760 tons.

Three more submarines are authorised under the programme of 1930, provided for in the Supplementary Estimate of July 9. These will not be laid down until 1931.

NEW GUNBOAT: H.M.S. FALCON.

An interesting little vessel is H.M.S. Falcon, the river gunboat authorised in the 1928 Navy Estimates, but not ordered until December, 1929, from Yarrow & Co., Ltd., Scotstoun, who also provide the machinery. The four gunboats completed in 1927–28 were of two designs, the Gannet being of 310 tons, 2,250 horse-power, 16 knots' speed, and with capacity for 60 tons of oil; and the Seamew being of 262 tons, 1,370 horse-power, 14 knots' speed, and with capacity for 50 tons of oil. Both types had an armament of two 3-inch and eight smaller guns. The Falcon is heavier and with a greater fuel capacity. She is of 354 tons, 2,250 horse-power, 15 knots' speed, with an oil fuel capacity of 84 tons, and is armed with one 3·7-inch howitzer and two 6-pounder guns.

FISHERY SURVEY VESSEL.

The First Lord announced in his Memorandum of March 3, 1930, that a new fishery survey vessel was to be built in the dockyards. This vessel is of approximately 1,400 tons, flush-decked, and built on similar lines to the surveying ship Endeavour. She is being equipped for fishery survey work in cold climates. Further particulars are: Length, over all, 220 ft.; beam, 35 ft.; mean draught, 12½ ft.; machinery, triple expansion reciprocating engines, 1,200 i.h.p.; single screw, speed 12½ knots; total oil fuel capacity, 340 tons. The vessel was laid down at Chatham on September 1, 1930, and will be called the Challenger. The greater part of her hull and equipment is being constructed there, and the machinery by private tender. She should be finished in August, 1931.

SHIPYARD LABOUR.

The amount of shipyard labour involved in the building of the various classes of modern vessels of war is a frequent subject for discussion. Replying to a question in the House of Commons on July 29, 1930, the Financial Secretary to the Admiralty said that the number of men employed on the construction of a cruiser was from 500 to 550; for a destroyer, 130; and for a sloop, 180. These numbers referred exclusively to Admiralty employees in the dockyard and represented an average taken over the whole period of construction. The effect of such figures is entirely misleading. Numbers fluctuate at various stages of a ship's construction, and over a score of different trades are involved, some of them early on, others, such as the painters, are most busy in the concluding stages. That is why regular building is so desirable if labour is to be stabilised. But there is also a vast amount of outside work which goes to the making of a ship, from the basic industries such as coal and iron to the most minute article of her equipment. The area of employment thus involves not hundreds, but thousands, spread over all parts of the country.

PEMBROKE DOCKYARD TRANSFERRED.

H.M. Dockyard at Pembroke Dock was transferred to the Air Ministry as from March 31, 1930, although the officer in charge was retained up to June 13, 1930. There is now no resident naval authority at Pembroke Dock, and the duty of reporting arrivals and departures of H.M. ships devolves upon senior or commanding officers. A deputy naval store officer remains in the dockyard for charge of the oil fuel depot. Pembroke Dock had been a permanent naval establishment since 1815. The last armoured ship built there was the Defence, launched in 1907; and the last light cruiser the Curacoa, launched in 1917. During the Great War, the yard also built other types of vessel, including submarines.

Deep-Water Diving.

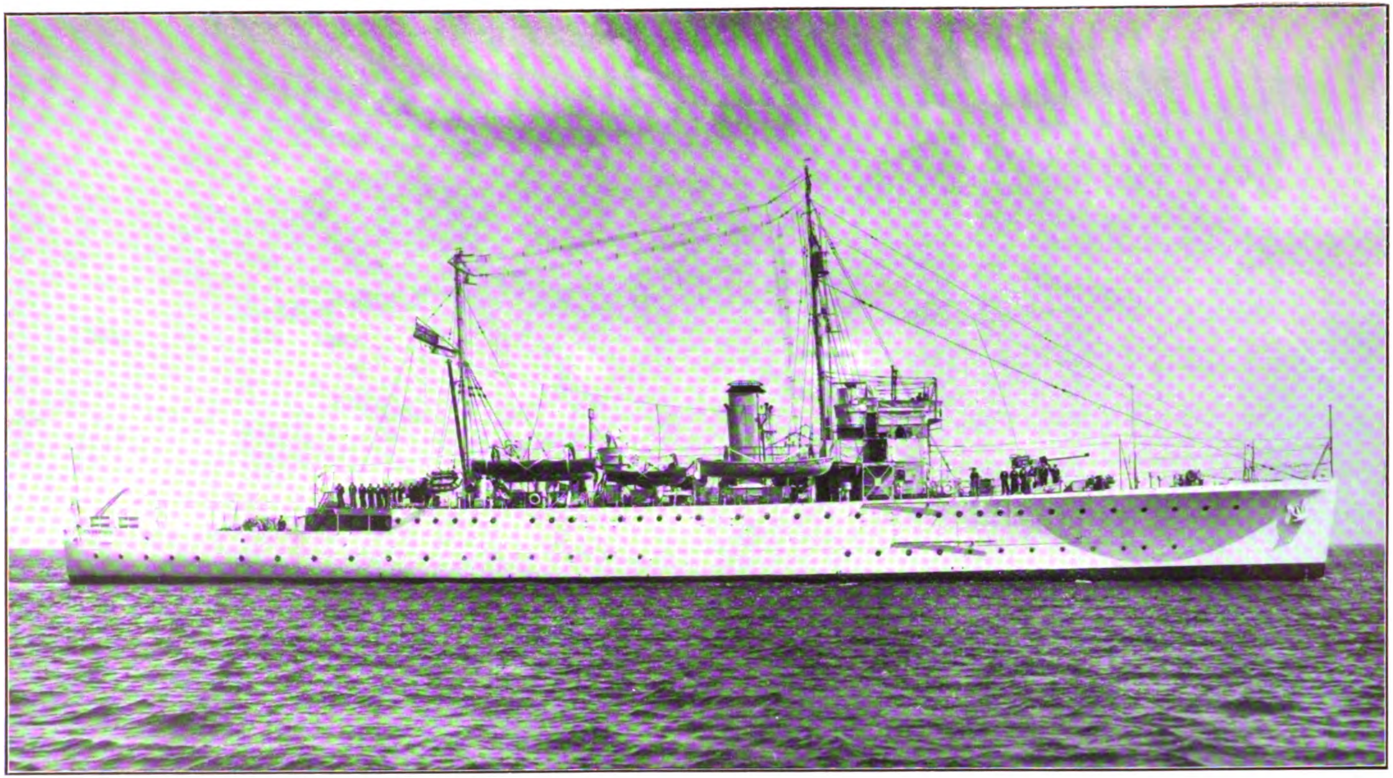
Reference was made in Admiralty Fleet Orders on September 12, 1930, to recent deep diving trials with improved apparatus and altered procedure which had demonstrated the practicability of diving to a much greater depth than had formerly been possible. Diving is carried out in an ordinary diving dress, suitably modified for deep-water diving. A submerged decompression chamber, constructed on the diving-bell principle, is used for decompressing the diver. The chamber is lowered in the water to the depth of the diver's first "stop," the diver ascends in the normal manner as far as the chamber and enters it through the lower end; an attendant in the chamber disconnects the airpipe and breast rope, removes the diver's helmet and closes the lower door of the chamber, which is then hoisted clear of the water. Subsequently, the pressure inside the chamber is lowered in accordance with the decompression table. In order to assist in the removal of the nitrogen absorbed by the diver's system during the dive, he breathes oxygen from a special apparatus inside the chamber. On completion of the decompression the diver leaves the chamber by a door in the top. Dives have been carried out at depths up to 58 fathoms utilising this method. As only a few men capable of diving to 25 fathoms have the necessary physical and mental qualities for diving to deeper depths, a new deep-diving section has been formed, and extra pay of 9*d.* a day for "seaman deep diver," and 1*s.* 2*d.* a day for "artificer deep diver," has been sanctioned.

The Singapore Base.

The "slowing down" of work at the new naval base at Singapore was announced by the First Lord in the House of Commons on November 13, 1929. Progress is being made with the main engineering contract, placed in September, 1928, but all work that can be suspended is being left, and no new work is being embarked upon. Unless they are altered by a review of policy which is being undertaken in consultation with the Dominions, the date for completion of the main contract is September, 1935, and that for the equipment of the base about September, 1937.

On July 9, 1930, it was officially announced that the total expenditure on the base to date, including the floating dock, was £2,577,000. The estimated total expenditure was £8,721,000. Contributions had been received from the Dominions and Colonies to the extent of £1,672,000, the whole of which had been applied towards naval expenditure incurred to date. The cruiser Cumberland, on her way home from the China Station to recommission, was the first ship to use the new floating dock, on September 16, 1929.

At the Imperial Conference in October, 1930, the future of the Singapore Base was remitted to a special committee, of which the members included the Prime Ministers of Great Britain, Australia, and New Zealand; Mr. Snowden, Chancellor of the Exchequer, and Mr. Henderson, Foreign Secretary; and the Heads of the three



[*Photo by Frank and Sons, South Shields.*

H.M. SLOOP FOLKESTONE, 1,040 TONS.

Commissioned at Portsmouth, July 1, 1930.

(*By courtesy of the builders, Swan, Hunter and Wigham Richardson, Ltd., Wallsend-on-Tyne.*)

Defence Services at home, Mr. Alexander, Mr. Thomas Shaw, and Lord Amulree. It was understood that this committee reported in favour of completing the base according to contract. The view taken was that the present policy of the ultimate establishment of a defended naval base at Singapore should be maintained and the Jackson contract continued. It was, however, also recommended that, apart from the latter expenditure and such as will be required for the completion of the air base on the scale at present contemplated, the remaining expenditure, for completing the equipment of the docks and for defence works, should be postponed for five years, when the matter could be reviewed in the light of relevant conditions then prevailing.

RENDITION OF WEI-HAI-WEI.

An agreement for the rendition of Wei-Hai-Wei to China was signed on April 18, 1930, in Nanking. Negotiations towards this change were begun as a result of the offer to return the territory to China at the Washington Conference in 1922, but they suffered many interruptions owing to changes of government and to civil war in China. The agreement signed at Nanking by Sir Miles Lampson, the British Minister, and Mr. C. T. Wang, Chinese Minister for Foreign Affairs, provided for the restoration in full sovereignty to China on October 1, 1930. British ships will be able to visit the harbour as hitherto during the summer months and have full use of it. The R.N. sick quarters will be maintained as before under a surgeon commander, R.N.

THE FLEET AIR ARM.

The completion of the Glorious at Devonport in February, 1930, brought up the total of British aircraft carriers to six, excluding the Ark Royal, the original ship of this class, which is not regarded as part of the war fleet, and the small seaplane carrier Albatross, in the Royal Australian Navy. The Glorious was allotted to the Mediterranean in place of her sister-ship the Courageous, which was transferred to the Atlantic Fleet, from which the Argus was withdrawn to reserve at Devonport.

The flights embarked in the Glorious were Nos. 405, 406, 407, and 408 Fighter Flights ("Flycatchers"); Nos. 441 and 447 Spotter Reconnaissance Flights ("Fairey IIIF"); and Nos. 461 and 462 Torpedo Bomber Flights ("Ripon II"). These were drawn from the Furious, Argus, and Courageous, and from the R.A.F. base at Donibristle.

A Fleet Order states that every effort is to be made to ensure that all midshipmen undergo the junior officers' air course while holding that rank. The names of those who are unable to do so are to be specially reported to the Admiralty on discharge to shore courses, in order that arrangements may be made for them to undergo the course after appointment as sub-lieutenant.

Arrangements have been made with the Air Ministry for courses in recent developments of meteorology to be open to surveying officers. These courses are described elsewhere.

By Fleet Order dated October 17, 1930, it was decided to introduce distinguishing badges, in the form of an aeroplane, for telegraphist air gunners, to be worn underneath the telegraphist badge. A request for such badges was put forward by the telegraphists at the 1928 Welfare Conference.

Further particulars about the work of the Fleet Air Arm are contained in a later chapter.

ROYAL MARINES.

The maximum number of the Royal Marines authorised for 1930–31, viz. 378 officers, 37 warrant officers, and 9,619 other ranks, showed a reduction of 215 officers and men on the total of the previous year. A notable change decided upon during the year was the transfer of the Royal Naval School of Music from Eastney Barracks, Portsmouth, to the Royal Marine Depôt, Deal. The main reason for this transfer, which took effect on October 1, 1930, was economy. The number of men stationed at Deal had decreased by about 500 during the last few years, whereas the numbers at Portsmouth had been increasing, and if the School of Music were to remain at Portsmouth would still further increase as a result of the concentration of land artillery training and other special work there. "This extreme and constant shortage of accommodation," said the Parliamentary Secretary of the Admiralty, in a letter to the Lord Mayor of Portsmouth, "has been partially met by putting a large number of men on the lodging list, which involves a substantial annual expenditure. Moreover, unless the number of men at Portsmouth is reduced, a considerable capital expenditure will be required in the immediate future. In addition, the transfer of the School of Music to Deal will permit other savings to Navy Votes of something like £7,000 a year." Mr. Ammon added that the Admiralty considered that the transfer to Deal would be for the ultimate good of the School of Music and the welfare of the band boys. The accommodation at Deal was more satisfactory, and the difficulty with regard to lack of a proper practice hall could be overcome. No difficulty was anticipated regarding recruiting. On the contrary, a new and wider recruiting area would be opened up. Recreational facilities at Deal were superior to those at Portsmouth, and the School of Music would be able to take engagements in Kent which were formerly undertaken by the Royal Marine Depôt band, which is to be abolished.

DOCKYARD COMMANDS.

The precedent referred to in the "Annual" of 1930 which was set in the case of Devonport Dockyard by the reappointment of Vice-Admiral Oliver Backhouse after his retirement in October, 1929, was repeated in the case of Portsmouth Dockyard in May, 1930. On May 23, Rear-Admiral L. A. B. Donaldson, C.B., C.M.G., was promoted to Vice-Admiral. He was placed on the retired list on May 24, and reappointed as Admiral-Superintendent. A Fleet Order lays down that an Admiral-Superintendent, promoted to Vice-Admiral and placed on the retired list for lack of qualifying service, during the tenure of his appointment, shall continue to carry out precisely the same duties as when on the active list, including the general administrative duties which devolve on him in the absence of the Commander-in-Chief, and, for the purposes of seniority with Vice-Admirals on the active list, shall rank and command as if he were still on the active list.

The prolongation of the tenure of Admiral-Superintendents has materially reduced the opportunities of employment for rear-admirals, and from this point of view would appear to be a retrograde step. The retirement regulations, particularly in regard to non-employment, having been made so much more stringent, it becomes more or less an obligation upon the Admiralty to provide a certain amount of employment for rear-admirals, otherwise they incur the risk of losing the services of certain valuable officers who might be wanted in case of emergency. A dockyard appointment has, moreover, in the past furnished some of our best admirals with two years' or more useful administrative experience. Under the new regime, it will come to be looked upon as the end of an officer's career for the chosen few. The extension of tenure seems to have been decidedly solely on what may be called civilian and industrial grounds, and without regard to the welfare of the Navy as a whole. It was felt that two-year terms were insufficient for the holders to give of their best service ; they were, in effect, learning their jobs for most of that time. Certainly, it is open to argument that a naval officer coming fresh to the control of a dockyard cannot be expected to know as much about the technical and industrial questions involved as his civilian heads of departments who are permanently employed in the yards. On the other hand, the yards exist for the Navy, not the Navy for the yards, and no one can know better the needs of the fleets and squadrons, and their degree of urgency, than the naval officer. The old system worked well for years, and stood the test of war.

ENTRY AND EDUCATION.

The whole question of the entry of cadets and officers has been under review during the past year. On October 30, 1930, the First Lord, Mr. Alexander, announced in reply to a question in Parliament that a committee had been set up under the chairmanship of Captain Sir Ernest Bennett, the Member for Central Cardiff, with the following terms of reference : "To consider whether the present systems of entry of naval cadets and naval cadets (E.) are such as to give candidates of the requisite standard from all types of schools and belonging to all classes of the community a fair opportunity of being considered on their merits for entry as cadets, and if not, to report what changes are recommended in order to extend the field of selection, subject to the requirements of the Naval

Service." Of the four remaining members of the committee, two are senior naval officers, Admiral of the Fleet Sir Osmond de B. Brock and Rear-Admiral the Hon. R. A. R. Plunkett Ernle-Erle-Drax; while educational opinion is represented by Sir Edmund Phipps, late Deputy-Secretary of the Board of Education, and Mr. F. R. Dale, Headmaster of the City of London School. Mr. H. V. Markham, of the Secretary's Department, Admiralty, was appointed Secretary.

The importance of this subject cannot be over-estimated. It has many aspects, and one which proved a stumbling block to all attempts to widen the field of selection in the past was financial. The estimated amount of the fees paid by parents and guardians at Dartmouth in 1929 was £68,000, and in 1930, £62,000. Any reduction in the scale of fees, or the numbers taken in via Dartmouth, would mean an addition to the Navy Estimates, but it would be trifling in comparison, and probably well worth it. The ideal aimed at by the late Lord Fisher was that the State should assume the whole cost of naval education, so that no boy with the requisite qualifications should be debarred by lack of means. The age of entry, the relative merits of Dartmouth and public school cadets, the provision of scholarships, and the question of selection for engineering duty are other matters opened up by this decision to review the whole question of the recruitment of officers.

There is also the further important question of promotion to commissioned rank from the lower deck, about which there has been much discussion during the year. In the debate on the Estimates on March 17, Mr. Alexander anounced his intention to have a departmental inquiry into the working of the mate scheme. "I am not at all satisfied," he said, "that the mate scheme, and especially that part of it which deals with the executive branch, is producing enough applicants for promotion." It will be recalled that the mate scheme was instituted by Mr. Churchill in 1912, and produced a useful supply of junior officers during the war, the greater number of whom were "axed" in 1922. Of those who remained on, a very small proportion have been promoted beyond lieutenant-commander, and hardly any have specialised or had opportunities for specialising. The original minimum age for selection for a commission (25 years) proved a handicap to later advancement. This it was sought to overcome in 1920 by reducing the age to 21, but although in theory it is now possible for an A.B. who has passed for leading rate to become an officer at this age, in practice the transition is difficult and rather too violent; the candidates lack experience as petty or warrant officers and some find the educational standard difficult to attain. A falling off in the number of suitable applicants has been noted for some time. Speaking on March 17, 1930, during the Navy Estimates discussion, Mr. Alexander said:

> I think that what needs to be done is to consider, side by side with the general question of promotion to mate, the whole question of entry into the officer ranks of the Service. We are now bringing in a new system of national education, under which, we hope, sooner or later, there will be a free educational road right through from the elementary school up to the end of the secondary school period, and, if

possible, on to the university; and, whatever branch of the public service is available, I want those who go through the national system of education, as apart from private and public school education, to have an equal opportunity of entering that Service. I believe that my inquiries will show that there is room for extending the special entry system, and for its including a larger number of candidates of the secondary school type than we have had in the past, and that we shall really democratise, if I may use that term, the officer ranks in the Navy, and I hope in the other Services, in such a way that a man will not be caused to feel awkward and out of place when, at an age, perhaps, too late, he is suddenly introduced into the officers' mess or the wardroom on board ship.

The members of the committee on the mate scheme are: Vice-Admiral Frank Larken, C.B., C.M.G., Commanding the Reserve Fleet, Chairman; Sir Charles Walker, Deputy Secretary of the Admiralty; Engineer Rear-Admiral H. L. Parry, of the Second Sea Lord's staff; Captain A. T. B. Curteis, and Commander James Figgins, of whom the last-named is the senior ex-mate on the active list.

PROMOTIONS AND PROSPECTS.

With naval reduction so much in the air, the past year has naturally not been a bright one from the standpoint of the prospects of the great bulk of officers. On January 3, 1930, a change was announced in the zone of lieutenant-commanders for promotion to commander, which was moved higher up the list. Whereas up to the selection for January, 1930, it included officers of from 2½ to 6½ years, it was altered to include those of from three to seven years' seniority. The zone for commanders to be promoted to captain remained unchanged, at from four to eight years.

There has been a significant reduction during 1930 in the state of the active list of flag officers. For some time, the total of rear-admirals, including those borne supernumerary to establishment for service with Dominion or foreign governments, stood at 48. This was brought down to 41 by the omission to promote captains in vacancies as they occurred. No promotion to the rank of rear-admiral on the active list was made after May 23, 1930, although the following retirements occurred: Vice-Admiral L. A. B. Donaldson, C.B., C.M.G. (May 24), Rear-Admiral W. de M. Egerton, D.S.O. (June 1), Rear-Admiral J. W. Carrington, D.S.O. (August 1), Rear-Admiral N. E. Archdale, C.B.E. (August 30), Rear-Admiral Geoffrey Hopwood, C.B.E. (September 1), Rear-Admiral G. A. Wells (September 11).

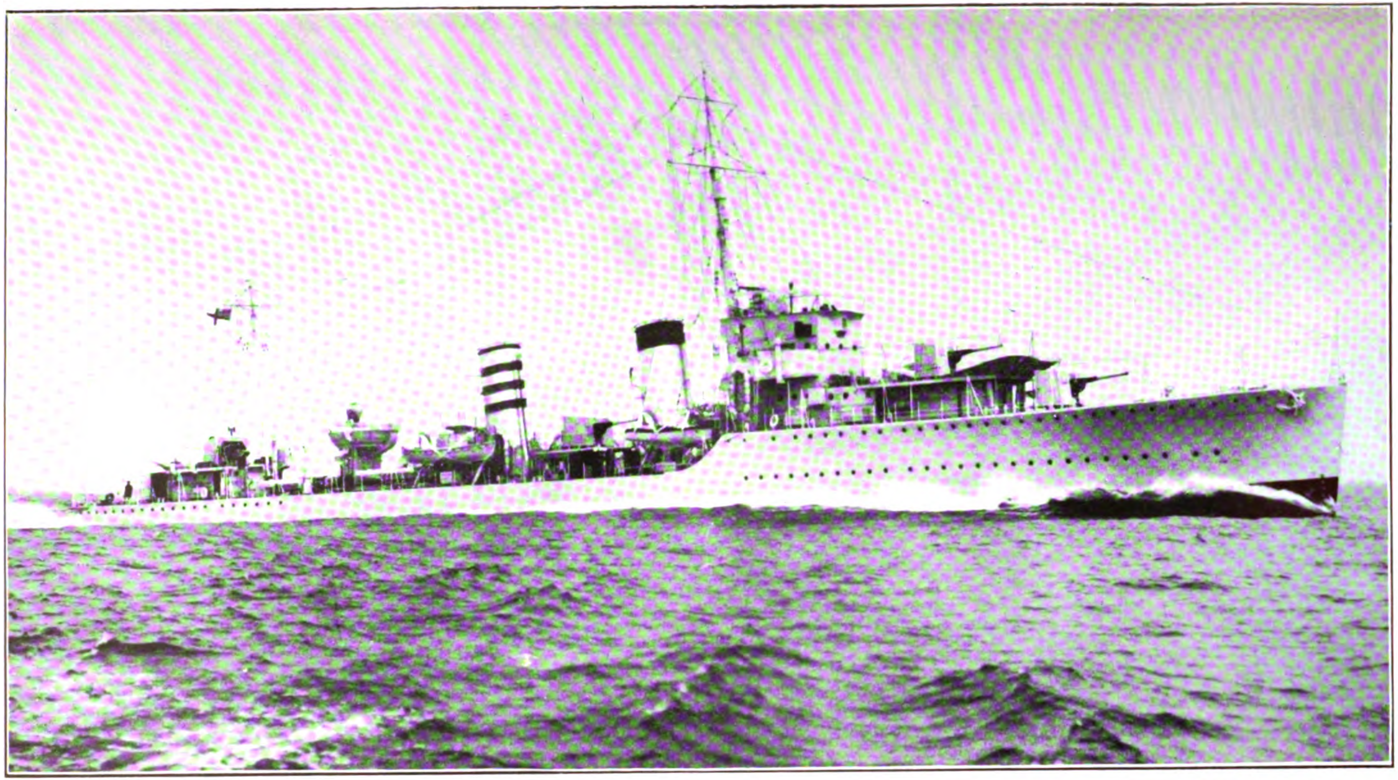
Owing to the reductions in the number of battleships and other large ships in commission, it has for some time been necessary to curtail the period of captains' service in such vessels, in order to allow captains waiting employment to get in the necessary amount of sea time. It is seldom that the commanding officers of the larger ships remain in them for more than a year or fifteen months. Two changes have recently been made with a view to increasing the amount of employment for officers of this rank. Certain sloops on foreign stations, such as the Heliotrope, in the West Indies, and the Clematis, in the Red Sea, have been allotted to captains instead of commanders; and in the Atlantic and Mediterranean Destroyer Flotillas, captains are appointed to one division leader in each flotilla, instead of commanders. The latter measure gives employment to six more junior captains, who are, as it were, second captains in the flotillas, available to understudy the Captains (D), and forming a reserve of suitable officers from whom, at a later stage, new Captains (D) can be chosen.

Naturally, this provision of more work for captains means so much less opportunity of service for commanders. The zone for promotion among the latter officers is still very crowded, and another difficult problem is presented by the number of commanders and lieutenant-commanders who have passed beyond their zones and have not been selected. With hope of advancement to a higher rank gone, they still have to serve on in order to qualify for a better rate of retired pay, and so tend to become only time-servers. A damper is naturally put on an officer's initiative and keenness when he finds that he has no more chance, in the ordinary course of events, of a step in rank, but is remaining on merely to get in as much time as possible in order to increase his rate of retired pay. The presence of a number of such officers cannot be a good thing for the Service. One suggestion which has been made is that a small number of promotions might be reserved for those officers who have passed the ordinary zones, in order that they might still have some incentive in their service.

In other ranks and branches, the effect of reductions in establishments is inevitably towards stagnation in promotion. Among candidates for warrant rank this has been particularly felt. There were, for instance, no promotions to gunner and boatswain during 1929, "owing to reductions in Fleet requirements," said the First Lord on May 7, 1930. At the Navy Welfare Conference of 1930, request No. 6 was "That it should be officially recognised that when it is necessary to reduce the numbers of higher ratings in the various branches of the Royal Navy, the immediate reaction resulting should be a public liability, and not an immediate liability confined to the unfortunate ratings at the top of the advancement rosters." How this was to be made a public liability was not indicated. One method would be to discharge the surplus candidates passed for promotion, with liberal compensation ; this would hardly satisfy the individuals concerned, and would also mean the discharge of a number of selected and promising petty officers and C.P.O.'s. Another method would be to promote the men, even though surplus to establishment, but this would raise difficulties in employment and administration, for two officers could hardly be appointed to one billet, nor could a warrant officer be set to perform duties rightly appertaining to a C.P.O. or P.O.

MEDICAL BRANCH SHORTAGE.

The First Lord referred in his speech on the Navy Estimates on March 17, 1930, to the concern felt over the difficulty of obtaining an adequate supply of medical officers, in spite of the special efforts that had been made during the previous twelve months. It appears that at the end of 1929, the total number of medical officers had



[Photo by Frank and Sons, South Shields.

H.M. FLOTILLA LEADER CODRINGTON, 1,520 TONS.

Commissioned at Devonport, June 11, 1930.

(By courtesy of the builders, Swan, Hunter and Wigham Richardson, Ltd., Wallsend-on-Tyne.)

declined to 372 from 390, as compared with a total of 454 in 1920. During 1929, there were only 19 entries and 37 retirements, etc., and during the previous ten years the entries had only twice exceeded the withdrawals. This scarcity of medical officers seems to be a recurring problem. It is to be hoped that measures may be found by which it can be alleviated. So far, the health of the Fleet continues to be good. The more substantial provision now made for recreation and welfare services has been a helping factor in this respect. The Statistical Report of the Health of the Navy for 1928, issued on March 21, 1930, stated that the total force was 90,820, and the total number of cases of disease and injury entered on the sick list was 40,505, which gave a ratio of 445·99 per 1,000, a decrease of 26·64 compared with the five years' average and of 33·06 in relation to 1927. The Atlantic Fleet showed the lowest sick rate.

The Royal Navy Medical Service forms the subject of a special chapter in this issue of the "Annual."

PAY, PENSIONS, AND ALLOWANCES.

The triennial review of officers' pay as from July 1, 1930, resulted in another reduction, the third to be made since the standard rates were approved in 1919, after exhaustive inquiry, by the Committee under Admiral Sir Lionel Halsey. A Fleet Order (3085/29) announced that the average of the cost of living index figures for the six months ending December 31, 1929, would, it was estimated, be slightly under 65, and under the formula prescribed in A.F.O. 3433/25 the rates of pay, retired pay, etc., ruling from July 1, 1930, until June 30, 1933, would approximately have been 92 per cent. of the standard rates, i.e. a reduction of 8 per cent. The Government decided, however, after full consideration of the circumstances, that the reduction from standard rates should be limited to 7 per cent. (subject to the rounding off of odd amounts as before) in place of the 6 per cent. which had obtained since July 1, 1927. These new rates took effect from July 1, 1930, and are to be in force for a period of twelve months from that date. Similar alterations were made in the pay of Army and Air Force officers.

A cut of 1 per cent. in a full year, with the vote for naval officers' pay at about £2,900,000, should result in a saving of only £29,000, but as against this there has to be placed the higher average rates resulting from increases of pay falling due for length of service, so that the saving is even smaller. To obtain this modest amount, the Government have to adopt a course which is not merely unpopular among the great bulk of officers, but is rightly regarded as unjust, because it is arrived at by means of a formula which is wholly inapplicable to the case of a naval officer, particularly a married naval officer. It takes no account of the special expenses to which he is liable by the nature of his service and the obligation upon him to maintain two establishments.

The revised rates of pay, issued as part of Appendix 1 of the Navy Estimates, showed how trifling were the cuts in the lower ranks. No change whatever was made in the rates of cadets, midshipmen, or sub-lieutenants. The pay of mates was reduced by 2*d.* a day, from 15*s.* to 14*s.* 10*d.* Lieutenants also lost 2*d.* a day; lieutenant-commanders, 4*d.* a day; commanders, 6*d.* a day; and captains, 8*d.* a day. Cuts of this nature have the appearance of being petty and trivial, but their cumulative effect is irksome and irritating. There is a strong case for the abolition of "standard rates" which can never, under present conditions, be earned, and for the stabilisation of pay on a level free from these periodical fluctuations.

REDUCED PENSIONS FOR MEN.

Reductions on account of the cost of living do not apply to the pay of the men. The older men receive the same rates as were approved by the Jerram Committee in 1919. The only alteration in the basic rates of men's pay is in the case of those entered subsequent to October 4, 1925. For new entries after that date, lower rates of pay were adopted, varying from 10 to 25 per cent. (see the "Annual" for 1927, p. 15). For some years, therefore, there will be cases of men holding the same rating and doing similar work for less pay, merely by the accident of having entered a little later than their fellows.

The fall in the cost of living was invoked in 1930 for a reduction in the scale of pensions for new entries. A Fleet Order of March 14 provided that the rules for computing long service and disability pensions should be modified, for new entries and re-entries only, from so much per day to so much per week. Long service pensions had formerly been calculated on a basic rate of 1½*d.* a day for each year of service; the new rate is 8*d.* a week for each year of service, a weekly loss of 2½*d.* Good conduct badges formerly carried additions to pensions of 1*d.* a day for one, 2*d.* a day for two, and 3*d.* a day for three. In future, they will carry 6*d.* a week for one, 1*s.* a week for two, and 1*s.* 8*d.* a week for three; and the addition for V.G. character throughout service is reduced from 1*d.* a day to 6*d.* a week.

Disability pensions, as regards the basic rate of service element, for naval ratings and marines over 14 years' service were cut from 1*s.* 6*d.* a day to 8*s.* a week, a loss of 2*s.* 6*d.* a week; over 16 years' service, from 1*s.* 9*d.* a day to 9*s.* 4*d.* a week, a loss of 2*s.* 11*d.*; over 18 years' service, from 2*s.* a day to 10*s.* 8*d.* a week, a loss of 3*s.* 4*d.*; and over 20 years' service, from 2*s.* 6*d.* a day to 13*s.* 4*d.* a week, a loss of 4*s.* 2*d.* There were similar reductions in the pensions of non-continuous service officers' stewards and cooks with no sea service. The reduced scales apply to all men and boys finally entered or re-entered in the Royal Navy or Royal Marines after March 31, 1930. Men transferred from the Army without re-enlistment for continuation of service in the Royal Marines were made eligible for the old rates, if they were entitled to such at the date of transfer.

REDUCED KIT ALLOWANCES.

While there has been no general cut in the pay of the men of the lower deck, they have sustained reductions in certain of their other emoluments. Revised kit upkeep allowances were brought into force on July 1, 1930, which showed a reduction of about 6 per cent. The following are the new rates, with the old rates shown in brackets : Chief petty officers, and petty officers wearing the special uniform of that rating (class III. dress with gilt buttons and pattern 49 cap badge), £8 10*s*. (£9) ; other ratings, dressed as class II., £6 10*s*. (£6 17*s*.) ; other ratings, dressed as Class III, £7 18*s*. (£8 8*s*). The above rates are payable to boys under training. The additional allowance for submarine ratings was reduced from 17*s*. to 16*s*. in the seaman class, and from 13*s*. to 12*s*. for other ratings. There were corresponding reductions in the R.N. Shore Wireless and Shore Signal Service, and in the allowances to Maltese and other native ratings. Clothing gratuities were also decreased. Petty officers dressed as seamen, on changing uniform after a year's service as P.O., and being confirmed, will receive £10 10*s*. instead of £11 ; petty officers in the Shore Wireless Service, £8 10*s*. instead of £9 ; and Maltese petty officers, £4 instead of £4 4*s*.

VICTUALLING ALLOWANCES REDUCED.

A Fleet Order on August 22 instituted revised issuing prices of service provisions to be brought into force from October 1, 1930, and concurrently the rates of messing, victualling, provision, etc., allowances were reviewed in relation to these prices and the current prices of foodstuffs generally. Messing allowance (8½*d*. a day) and Sunday dinner allowance (3*d*.) were unchanged, but the following were reduced : Victualling allowance, from 1*s*. 4*d*. to 1*s*. 3½*d*. a day ; provision allowance for officers, from 3*s*. 3*d*. a day or £52 10*s*. a year to 3*s*. 2*d*. a day or £51 a year ; provision allowance for men (also long leave allowance) from 2*s*. 5*d*. to 2*s*. 4*d*. a day. The average daily cost of general messing was not to exceed 1*s*. 3½*d*. a head for men and 1*s*. 5*d*. a head for boys under training, as compared with 1*s*. 4*d*. a head for men and 1*s*. 5½*d*. for boys under the previous schedule.

RECRUITING.

Whether the changes referred to have given rise to any feeling of grievance is not clear. The requests brought before the Welfare Committee ought to show this. But at any rate the reductions have tended to accentuate the feeling of uncertainty already existing, and in a normal year this might have been expected to affect recruiting. But with the reduced entries now being made, there is no difficulty in finding sufficient boys of the right sort for the Naval Service. The authorised number of boys in the Navy Estimates of 1930 was 1,232, as compared with 2,077 in the previous year ; this figure refers to boys for service. The total of boys for training was 2,270, as compared with 2,578 in the 1929 Estimates. The cost of recruiting for the year 1930 was estimated at £21,000, a reduction of £3,000 on the previous year ; the number of officers and men employed in the Recruiting Service showed a slight reduction.

CENTRAL STOREKEEPING.

The system of central storekeeping, which was started as an experimental measure in certain Atlantic Fleet ships in the first year after the War, is now in general use, and has been found to be not only more economical but to enhance efficiency. With the development of the modern Navy, ships' equipment has become more complicated, and the items of stores and spares much more numerous. On the ground of accommodation alone the old system of separate stores had shown signs of being out of date. It was difficult, sometimes impossible, to take stock properly of the stores on board a ship at any one time. Under the new system, by which the accountant officer is responsible for issuing stores of all kinds, instead of the various technical officers who may have to use them, a better check is kept on the stores, stocktaking is simplified and space and weight are saved by the elimination of articles which were formerly carried according to custom but which experience, carefully watched, has shown to be unnecessary. The success of central storekeeping reflects the highest credit on the officials of the Naval Store Department of the Admiralty, and on the paymasters of ships who have been responsible for working it afloat.

CENTRAL MESSING FOR OFFICERS.

Following on the success achieved with the general mess system for men, which is now the recognised practice in all the newer and larger ships, the Admiralty instituted on board the Rodney from January 1, 1930, a new scheme of central messing for all officers. The object was to amalgamate the feeding arrangements for the wardroom, gunroom, and warrant officers' mess, under the management of the accountant officer of the ship, with a view probably to better and cheaper messing. There was a distinct prospect of a saving to individual officers, owing to the larger numbers involved, than under the old system, whereby each mess was run by a messman or caterer. Only one galley was needed, instead of two or three, with a consequent saving in accommodation and cooking staff. The scheme was also ordered to be tried in the cruisers Hawkins and Delhi, which recommissioned about the same time.

Following a cruise in the Rodney in July, 1930, a naval correspondent of *The Times* reported that the central messing scheme had been an unqualified success. There are no separate galleys for wardroom, gunroom, and warrant officers' messes, the cooking for all three being done in one kitchen, manned by a staff of seven cooks. "All the officers," said this writer, "to the number of 100, are catered for by the paymaster commander as an offshoot to the general mess for the men, and the food, of which I speak from personal experience, is equal to or better than that in any ship in which I have ever served, while its variety is, or should be, sufficient to satisfy the most fastidious. . . . The menus are chosen by representatives from each mess, and though the food may be simpler in the messes whose members pay the least, the quality is precisely the same in all.

Bacon, eggs, cake, honey, and the more expensive varieties of fish, for instance, do not appear in the gunroom and warrant officers' messes with the same frequency that they do in the wardroom. One of the chief advantages of the scheme, however, is that there are no extras, afternoon tea, cake, jam, fruit, after-dinner coffee, and so forth being entirely free. This results in a direct saving of between, say, £1 and £2 10*s*. a month to every officer, which in these hard times is very welcome."

Uniform and Clothing.

Changes in uniform during the past year have been of a minor character. The pattern of the officers' helmet was amended, by an order dated May 2, to make it more comfortable to wear. Instead of the zig-zag ventilator between the headpiece and the body of the helmet, the new pattern has a headpiece composed of the fibre bands, the outer band clipped to the body of the helmet and joined to the inner band by steps of mercerised cotton tape, with a space between the two bands for ventilation.

A revision of the regulations respecting foreign orders, decorations, and medals applicable to servants of the Crown shows that, as regards the grant of full or of restricted permission to wear such, in no case can applications be considered in respect of decorations conferred more than five years previously, or offered in connection with services or events so long prior to the nomination.

A modified pattern of white duck cap for Class II ratings has been introduced. It has also been decided to substitute drill for duck as the material for No. 6 dress for men dressed in Class II uniform, but the white working suits will continue to be of duck. From August 1, 1930, the Admiralty notified that oilskin combination suits (non-tacky type) would be supplied as loan clothing for the protection of men employed cleaning and examining oil fuel tanks. On tropical stations, where the conditions make the combination suit too hot to wear, oilskin trousers suitably adapted for the purpose may be used in lieu, if preferred.

As a tentative arrangement, it has been decided to add sheets, pillow-cases and towels of naval store patterns to the officers' clothing list, for issue to officers on repayment. It was recalled by this change that not until 1885 or 1886, following the revelations of newspaper representatives who went afloat for the manœuvres, did the Admiralty order the cabins of officers to be furnished. Formerly officers were under the necessity of moving their own chests of drawers, washstands, baths, etc., about with them from ship to ship. These articles and bed linen were afterwards supplied at a fixed rental. Not until much later was officers' clothing put upon the issue list, to which the foregoing additions have been made.

Training.

From the regularity with which officers are appointed to them, it is clear that the Senior Officers' Technical Course at Portsmouth, the Senior Officers' War Course at Greenwich, and the more recently-established Tactical Course at Portsmouth, are not regarded as exceptional and voluntary on the part of the students. Officers are nominated to them as Service exigencies permit, and there can be no doubt that the higher education of the Service has benefited very much from this plan of keeping its members in touch with the latest developments and knowledge during the intervals between their periods of command afloat or service on shore. It is all to the good, too, that places at these courses are allotted to the Royal Naval Reserve and to officers of the Army and the Royal Air Force.

Arrangements were announced in December, 1929, with the Air Ministry for meteorological courses for surveying officers of the Royal Navy. One week's course of instruction in recent developments in this science, beginning on the Monday of any week, is available for not more than one officer at any one time, the officer being nominated by the Hydrographer of the Navy. There is also a four week's course in meteorology for senior surveying officers (i.e. first-class assistants) who show special aptitude for the work. These courses are held during the period November to March each year, and applications to undergo them must be made to the Admiralty through the usual channels.

The " Secretaries' Course," which was inaugurated at Portsmouth in February, 1920, was on January 1, 1930, renamed the " Accountant Officers' Technical Course." Reference to the Navy List, in which they are distinguished by the symbol (†), will show that the great majority of officers of the accountant branch have now passed this course.

A Fleet Order on April 25, 1930, dealt with the training given to boys in the Third Battle Squadron, based on Portland. The boys, and ordinary seamen not trained, are given instruction in seamanship, school subjects, and physical training. Instruction is not given in gunnery or torpedo. The seamanship course is directed to giving these ratings as much instruction as is possible in all sections of the syllabus, having particular regard to the practical work. The time available in three months does not admit of the completion of the syllabus, but the full number of hours' instruction is given in Section VIII (Boat Work). Boys are examined in this section only, unless they are retained in the Third Battle Squadron on completion of the three months' course for long enough to finish the full syllabus.

The training at sea has been begun of stokers, 1st class, in high-power electricity, in all battleships, battle cruisers, large aircraft carriers, and cruisers in full commission. The course consists of ten days' instruction in accordance with a syllabus published in A.F.O. 2982/1929. Classes consist of four stokers, 1st class, in heavy ships, and two or three in cruisers, depending on the size of the ship. Candidates are selected from those undergoing training in the operation of auxiliary machinery as and when they can be spared by the engineer officer. During the period of the training class, these ratings are ordered to be attached to the motor section of the torpedo party in working hours, and also, if possible, during out-of-working hours, so as to gain experience in care and maintenance duties.

It was announced on May 9, 1930, that through the generosity

[*Photo by W. Ralston, Glasgow.*

H.M. DESTROYER ANTHONY, 1,330 TONS.

Commissioned at Chatham, March 11, 1930.

(*By courtesy of the builders, Scotts' Shipbuilding and Engineering Company, Ltd., Greenock.*)

of a private donor, who desires to help the Service, a fund had been established called the Herbert Lott Naval Trust Fund, to enable Their Lordships to make awards to such of the personnel of the R.N., R.M., R.I.M., and Dominion Navies, whether active or reserve, who show marked efficiency in fighting practices, or contribute in signal degree to the improvement of the fighting appliances of the Naval or Marine Forces of His Majesty. The amounts to be awarded for fighting efficiency to the several fleets up to December 31, 1930, varied from £200 in the Atlantic and £180 in the Mediterranean to £10 each in the Anti-Submarine School and the Fishery Protection and Minesweeping Flotilla.

Importance is still being paid to the instruction and training of the petty officers. In Fleet Orders dated October 10, it was announced that acting petty officers of the seaman, signal, telegraphist and stoker branches shall, whenever possible, be transferred to other ships or establishments immediately on advancement to acting petty officer. All ratings of these branches, advanced to acting petty officers, and all men transferred to regulating petty officer are, after arrival in depot, to be regarded as not available for draft until they have taken the petty officers' course.

Vocational Training.

Excellent work continues to be done by the scheme of vocational training for men of the Royal Navy and Royal Marines, and during the Navy Weeks at the home ports steps were taken to exhibit the working of this scheme. It may be hoped that employers and others to whose notice it was brought were the more impressed with the capabilities and resourcefulness of our naval and marine personnel. A statement of the numbers of applicants for courses, the numbers trained, and those still under instruction, corrected to March 31, 1930, showed that very good results were obtained at all the home port centres, and the numbers trained at Portsmouth and Devonport were the highest recorded. In the six months ending March 31, 1930, there were 1,440 applicants, 762 were trained, and 315 remained under training. The sum allotted for vocational training expenses in the 1930 Estimates was increased to £8,000 from £6,000 in 1929. The increase was largely set off by an addition in appropriations in aid.

1930 Welfare Conferences.

The biennial Navy Welfare Conference was held in 1930, the central meetings being held at Portsmouth in the spring. The general requests put forward at these meetings numbered forty. It was asked that the items for discussion might be extended, with particular reference to the Navy, Army, and Air Force Institutes' administration. A superannuation scheme, on a contributory basis, was suggested for men leaving the Service after twelve years, and for invalids and dependents. One request was that compulsory church services be abolished and voluntary services substituted; and another asked the Admiralty to approach the railway authorities with a view to promoting some scheme, on the basis of a contribution of so much per head from a rating's pay, in order to enable free travelling on the railways when in possession of a leave ticket.

"NAVY WEEK" SUCCESS.

"Navy Weeks" at the three principal home ports were held, for the first time simultaneously and as a recognised permanent institution, from Saturday, August 2, to Saturday, August 9, 1930 (omitting Sunday, the 3rd). The period was fixed to coincide with the week's holiday on full pay granted to the industrial employees in the dockyards, which were closed for the week. In 1928, 198,348 people passed the turnstiles during the "Navy Weeks," and in 1929 this figure was increased to 235,273. In 1930, there was a further increase to 288,689, in spite of a decline of 7,200 in the attendance at Devonport for which bad weather was largely responsible. The figures were: Portsmouth, 137,568; Devonport, 80,193; Chatham, 70,928. At Portsmouth, the panorama of the Battle of Trafalgar, painted by Mr. W. L. Wyllie, R.A., for which accommodation has been specially provided in the vicinity of the Victory, was open to public view for the first time at a charge of 2*d.* Assisted by his daughter, Mr. Wyllie took nearly a year in the execution of this panorama. It shows the battle at 2 p.m. on October 21, 1805, as seen from the stern ports of the French 80-gun ship Neptune.

ARMED GUARDS IN CHINESE WATERS.

The Conservative Government in March, 1929, decided to withdraw, as from April 1, 1930, the guards provided by H.M. Forces for British ships in Chinese waters. It was considered there were other more appropriate measures open to the shipping companies for exercising effective control over the passengers by whom the piracies were committed. On March 24, 1930, a deputation waited upon the Admiralty to urge the need for maintaining adequate protection against piracy. Captain W. H. Coombs, of the Officers' (Merchant Navy) Federation, stated in an interview afterwards that the Government view was that the owners should pay for the cost of protection; but the officers' and shipping companies' view was that it was the Government's duty. Just as the Government protected the fisheries, and provided funds towards the cost of the North Atlantic ice patrol, so it was their duty, said Captain Coombs, to spend money for the protection of British ships in China. The date of withdrawal was postponed, and later in the year armed guards were still being provided for ships asking for them and which complied with certain conditions.

II.—THE DOMINION NAVIES.

The Imperial Conference of 1930 opened on October 1. It was attended by Mr. Bennett (Canada), Mr. Scullin (Australia), Mr. Forbes (New Zealand), General Hertzog (South Africa), Mr.

McGilligan (Irish Free State), Sir Richard Squires (Newfoundland), and representatives from India. Questions of defence were naturally included among the subjects considered by the Conference, but no authoritative pronouncement was made as to their outcome. On Saturday, November 1, 1930, the delegates to the Conference visited the Atlantic Fleet at Portland, under the command of Admiral Sir Michael Hodges, and saw from the Nelson a display by flying-boats from Calshot, diving by the submarines Oberon and Proteus, minelaying by the Adventure and minesweeping by the First Flotilla, evolutions by Fleet Air Arm aeroplanes from the Courageous, a submarine attack by an " L " boat on the Nelson, torpedo attacks by the Sixth Flotilla, a concentration shoot by the Second Battle Squadron, and firing upon the target-ship Centurion, under wireless control, by the Fifth Destroyer Flotilla.

AUSTRALIA.

Further reductions, owing to the urgent need of economy in public finance, have taken place during the past year in the seagoing fleet and the shore establishments of the Royal Australian Navy. Certain ships have been placed out of commission, the personnel has been reduced by some 700 officers and men, and the Naval College has been closed and its work amalgamated with that of the Flinders Naval Depot.

The Platypus, which served as destroyer and submarine depot ship and fleet repair ship, has been disposed of. The surveying ship Moresby was paid off into reserve on April 8, 1930. The destroyers Success and Swordsman have also been paid off into reserve, joining the Stalwart and Tasmania. The new submarines Otway and Oxley were paid off into Immediate Reserve on May 10, 1930. After these reductions, the seagoing squadron included only the Australia and Canberra, cruisers; Albatross, aircraft-carrier; and Anzac, flotilla leader; a total of four units. One of the proposals put before the Cabinet in the course of the economy discussions was that the two cruisers should be brought directly under the control of the Admiralty in London, but this was rejected as an altogether retrograde step, and the Naval Board was directed to proceed with alternative plans. The Prime Minister has made it clear that the Commonwealth Government does not favour any proposal for making Australia merely a Dominion station of the Royal Navy.

As regards the retrenchment of personnel, it was announced that compensation would not be paid to those selected for discharge; only accrued deferred pay, pay in lieu of extended leave (a scale based on length of service), and a limited amount of half pay, based on the merits of individual cases. The retrenchment was general in its application, and extended to officers and men serving in the United Kingdom. One lieutenant-commander, two lieutenants, two sub-lieutenants, and six midshipmen thus serving were notified of their discharge " on reduction " and were ordered to return to Australia.

It was decided in June, 1930, to transfer the Australian Naval College from Captain's Point, Jervis Bay, to Flinders Naval Depot, Victoria. No alteration was made in the technical or scholastic education of the cadets, about 50 in number, but a saving of £30,000 per annum was expected from the amalgamation of the maintenance staffs. About 14 officers and 100 ratings became surplus by the disbandment of the Jervis Bay staff. The Naval College was opened on February 19, 1915, and took the place of a temporary structure at Geelong, which had been used since March 1, 1913.

The plan for an interchange of cruisers was to have been resumed in 1930. The Shropshire, of the First Cruiser Squadron, Mediterranean, was ordered to leave Malta in October for Australia, to exchange with the Canberra, but on the arrival in England of the Australian Delegation, for the Imperial Conference, the Premier, Mr. Scullin, announced that owing to the need for economy the exchange had been postponed. The last exchange of this kind was between the Delhi and the Melbourne in 1926. The completion of the Australia and Canberra on the Clyde in 1928, and the return to England of the Melbourne, rendered an exchange inexpedient in that year.

The rates of pay and allowances of officers and men of the Royal Australian Navy were published in Admiralty Fleet Orders on April 17, 1930 (A.F.O. 1068/30).

CANADA.

There has been no change in the composition of the Royal Canadian Navy since the last issue of the "Annual," except for the loss of the Thiepval, but steady progress has been made with training, and an important event of the year was the launch of the new destroyers Saguenay and Skeena. These vessels were put afloat on July 11 and October 10 respectively, and are due for delivery in the spring of 1931. The contract for them was awarded to Messrs. J. I. Thornycroft & Co., Ltd., who also built in 1918–19 the Torbay and Toreador, now renamed the Champlain and Vancouver, which the new vessels are to replace. The "Saguenay" class have been designed to operate in conjunction with the "Acasta" class in the Royal Navy in case of need, but they also fulfil special Canadian requirements. These have included the provisions of heavier scantlings and sufficient stability to withstand an accumulation of ice on the upper decks, bridges, riggings, etc. The climatic conditions have also necessitated the provision of an elaborate heating system for the maintenance of a reasonable temperature in all living spaces when the outside temperature is sub-zero. Accommodation for the crew includes such amenities as a recreation space, and shower bath. Faster and more powerful motor boats are supplied, in view of the increased importance of the new vessels in their own service. The names chosen are those of well-known rivers in Eastern and Western Canada.

Early in 1930, the two Canadian destroyers from either seaboard joined up and made a cruise, for the first time in company, with a ship of the Imperial Squadron on the America and West Indies Station. The Champlain, Commander V. G. Brodeur, arrived at Bermuda on January 10 from Halifax. The Vancouver, Lieutenant-Commander R. W. Wood, also arrived there on January 21 from Esquimalt. They left on February 3, in company with the Durban, for a cruise to Nassau, Havana, Miami, Montego Bay, and Kingston, Jamaica. The Champlain and Vancouver returned to Halifax and Esquimalt respectively on April 15 and 17.

The minesweeper Thiepval went aground on an uncharted rock near Turret Island, Barkley Sound, Vancouver Island, on February 27, 1930. The ship was abandoned, and next day slipped off the rock and sank in 50 feet of water.

The rates of pay and allowances of officers and men of the Royal Canadian Navy were published in Admiralty Fleet Orders on October 17, 1930 (A.F.O. 2732/30).

NEW ZEALAND.

The New Zealand Division of the Royal Navy has included only one cruiser during 1930, the Dunedin, owing to the Diomede being paid off for large repairs, at Chatham Dockyard. The Diomede left England on October 23 for New Zealand by the Panama Canal. The Dunedin is herself due to come into dockyard hands for a thorough overhaul some time during 1931.

The Naval vote under the Defence Bill passed the House of Representatives on August 16, 1930, providing for an expenditure of £450,000, or £55,000 below that of the previous year. The Minister of Defence declared that owing to the country's position in the Pacific, and the arrangement with the Imperial Government, it would be impossible to effect any considerable reduction in the Naval vote for some years. In view of the provisions of the London Treaty limiting the size of vessels, the enlargement of the Auckland Naval Dock at a cost of £50,000 would probably now be unnecessary.

INDIA.

The Government of India continues to pay the Imperial Government a subsidy of £100,000 a year towards the maintenance of H.M. ships in Indian waters, on condition that there are always three of H.M. ships operating in those waters. To meet that condition, and provide for normal refits and dockings, the special service vessel Triad and three sloops are maintained at an estimated cost to Navy Votes of £132,000 a year. The estimated annual cost in 1891, when the agreement was made, was £117,000 a year.

The sloop Hindustan, which was ordered from Messrs. Swan Hunter and Wigham Richardson, Ltd., in 1929, was launched in May, 1930. She was the first purely combative ship built for the Indian Government since the decision to reorganise the Royal Indian Marine on a combatant basis. The Hindustan is similar to the "Bridgewater" class in the Royal Navy, but with modifications to make her more suitable for tropical service. She is of 1,150 tons displacement. Geared turbines of 2,000 horse-power will give her a designed speed of 16 to 16½ knots, with twin screws, oil fuel only being used. The turbines and water tube boilers have been supplied by Messrs. Hawthorn Leslie & Co., Ltd., Newcastle-on-Tyne. The Hindustan was the fifty-seventh sloop launched by the firm of Swan Hunter. She was commissioned on the Tyne on October 9, arrived at Portsmouth on the 12th, and left for Bombay on November 18, under the command of Commander C. B. C. Swayne, R.N.

Extracts from a report of Rear-Admiral H. T. Walwyn, C.B., D.S.O., dealing with the first six months of his service as Flag Officer Commanding and Director, Royal Indian Marine, were made public by the India Office. A recruiting campaign was organised in the Punjab, which seemed the most likely district, and as a result 50 boys were entered, and provision made for 50 more later, as the training ship Dalhousie could not accommodate more than 100 at one time. The Punjabi boys were described as of excellent physique, and appeared happy and contented; they were quickly taking to their new surroundings. The officers of the R.I.M. are excellent, said Rear-Admiral Walwyn. "They are very keen on their service, and only too anxious to be told what, to my mind, they do wrong. They are rapidly picking up gunnery, tactics, etc., and will do very well. They are all very glad that the period of doubt and shadow as to the future of their service is at an end. I am most favourably impressed with the men. . . . I consider the present boys under training will be ideal material for the sea service. . . . I see a great future for the Indian youth who joins this service with his heart in it."

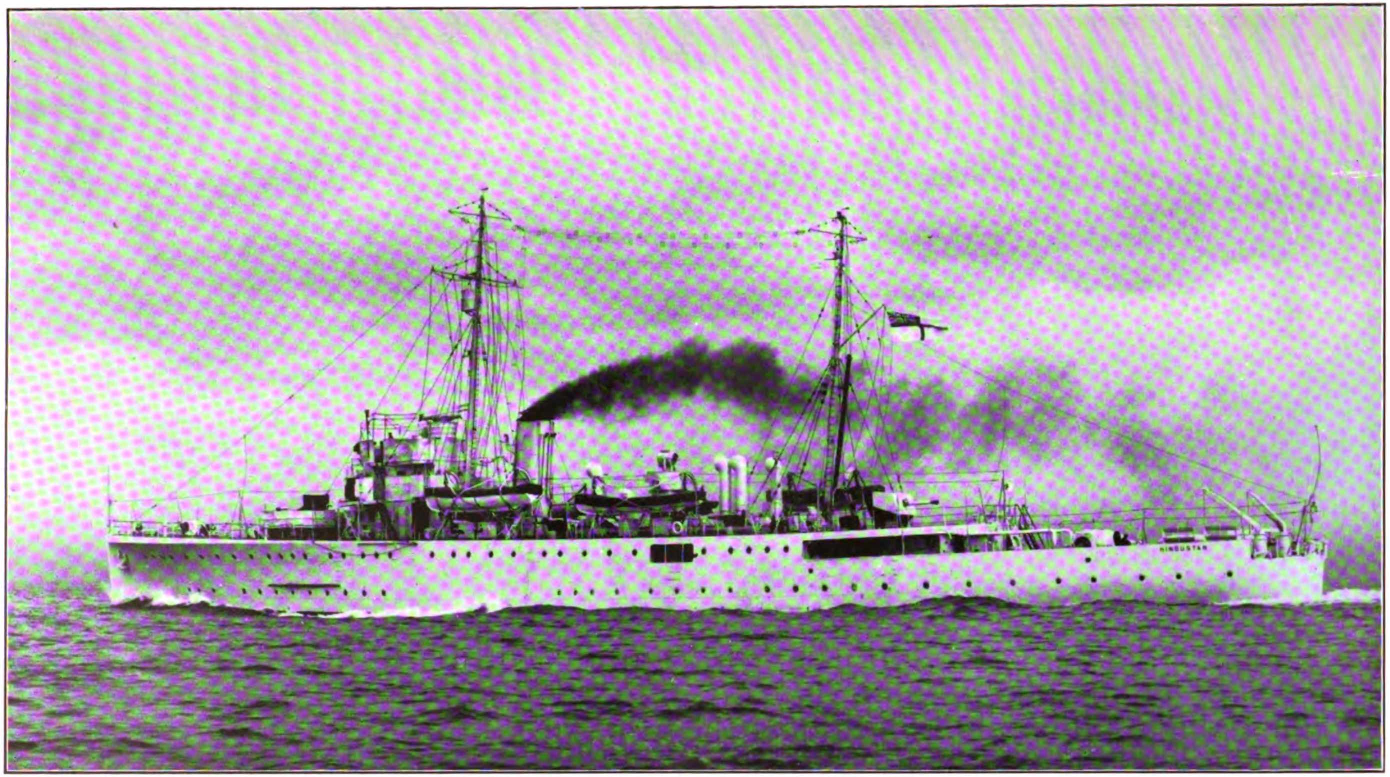
III.—THE YEAR'S EVENTS.

Loss of the St. Genny.

The fleet tug St. Genny was sunk during a gale off Ushant on the night of January 12, 1930, with the loss of 3 officers and 20 ratings. There were only 5 survivors. The St. Genny belonged to the Fleet Target Service, and had left Portland on the previous day with the sloop Snapdragon and the tug St. Cyrus. The St. Genny sent out an S.O.S. signal at 7.45 p.m., and foundered almost immediately afterwards. Calcium lights attached to lifebuoys were seen from the St. Cyrus, which had herself sustained injury to her steering gear and had dropped behind the other ships. Two men on the weather side could not be saved because of the terrific seas, but five on the lee side were rescued by lifebuoys and lines. The St. Cyrus was herself in danger of capsizing, and in a waterlogged condition steamed at 4 knots for 11 hours. The Snapdragon and St. Cyrus returned to Devonport. The officers lost in the St. Genny were Lieutenant Charles Frederick Paul, Commissioned Gunner Philip Stanley Lean, and Boatswain Charles Henry Beedell Burren.

Other Events of the Year.

It was a source of satisfaction to the Royal Navy that King George was able to resume his customary visit to Cowes for the



[Photo by Frank and Sons, South Shields.

H.M. INDIAN SLOOP HINDUSTAN, 1,150 TONS.

Commissioned at Wallsend, October 9, 1930.

(By courtesy of the builders, Swan, Hunter and Wigham Richardson, Ltd., Wallsend-on-Tyne.)

1930 Yachting Week. Their Majesties embarked in the Royal Yacht Victoria and Albert at Portsmouth, and during their stay off the Isle of Wight H.M.S. Warspite acted as guardship, attended by the destroyer Westminster. On the afternoon of July 29, their Majesties attended a special performance of the Naval Tattoo which was held on Whale Island to celebrate the hundredth anniversary of the establishment of the Gunnery School in H.M.S. Excellent. The Tattoo was held nightly from July 24 to 31. It included episodes representing the progress of naval gunnery from 1399 to the present day; sea chanties, cutlass drill, a hornpipe, and field gun displays; a reproduction by models of ships of the battle of the Glorious First of June; and a representation of the visit of King George III.'s visit to Lord Howe's flagship, the Queen Charlotte, after the action. The Tattoo, the first of its kind organised by the Navy, was admirably conceived and splendidly produced; in every way it was worthy of the occasion and the high reputation for efficiency of the Gunnery School.

Combined exercises, as in previous years, were held in March by the Atlantic Fleet under Admiral Sir Ernle Chatfield and the Mediterranean Fleet under Admiral Sir Frederick Field. Divided into two forces, the fleets carried out a strategical exercise to the southward and eastward of the Balearic Islands on March 10 and 11. The Red Fleet (Admiral Field) included 6 battleships, 8 cruisers, 1 aircraft-carrier, and the cruiser Cairo with 4 flotillas of destroyers, together with the Douglas and 4 submarines. The Blue Fleet (Admiral Chatfield) had 4 battleships, 3 battle-cruisers, 4 cruisers, 2 aircraft-carriers, the minelaying cruiser Adventure, the cruiser Centaur and 2 destroyer flotillas, and 5 submarines of the Second Flotilla. The combined fleets afterwards anchored at Palma. Between March 15 and 18 they carried out tactical exercises and then proceeded to Gibraltar.

Notable cruises of the year included a visit to Iceland by H.M.S. Rodney, Captain A. B. Cunningham, D.S.O., in connection with the thousandth anniversary of the foundation of the Icelandic Parliament, the Althing. She conveyed a deputation from both Houses of Parliament, which embarked at Rothesay on June 21 and arrived at Reykjavik on June 24. Other foreign ships present there were the Danish coast defence ship Niels Juel and the French cruiser Suffren. The Rodney was visited by the King of Denmark and by the Crown Prince of Sweden. Two flying boats of No. 209 Squadron, stationed at Mount Batten, Plymouth, were to have taken part in this cruise, but one, S. 1263, was detained at Stornoway by engine trouble. The other, S. 1264, proceeded to Reykjavik, her actual flying time from Mount Batten being 15 hours 40 minutes, and the distance about 1,211 miles. The total distance flown on the outward and homeward journeys was 2,300 miles in just under 30 hours, the average speed being about 80 knots.

H.M.S. Nelson, flying the flag of Admiral Sir Michael Hodges, visited Brest from July 5 to 10, and was cordially welcomed by Vice-Admiral Pirot, the Maritime Prefect, and officers of the French Navy. Among the festivities arranged in honour of the visit was a luncheon on board the Diderot by Vice-Admiral Violette, Chief of the Naval General Staff, who presented Sir Michael Hodges with a magnificent vase of blue Sèvres porcelain. " The blue of this vase," he said, " is the blue of France. May it declare to you the loyalty of our ideals."

The Second Cruiser Squadron, under Rear-Admiral the Hon. M. R. Best, visited Antwerp from July 16 to 23, in connection with the " British Week " at the International Maritime and Colonial Exhibition. The Squadron included the Hawkins (flagship), Frobisher, Norfolk, and York. Officers and men from the Squadron were entertained at Brussels and elsewhere, and visited Ypres and other places.

An interesting duty which befell the fishery protection sloop Harebell, Captain B. W. Barrow, D.S.O., was the embarkation of the inhabitants of St. Kilda for conveyance to the Scottish mainland. The last of the residents were removed on August 29, 1930, and conveyed to Oban, preparatory to their settlement in Morven, Argyll. The evacuation affected some 36 natives, together with the island nurse and the missionary and his small family.

A division consisting of the Curacoa, flagship of Rear-Admiral A. J. Davies, and the destroyers Ardent and Antelope, visited Constanza from August 19 to 26. This was the first visit of British warships to Roumania for some time. King Carol sent a telegram to King George expressing thanks for the visit, and announcing a return visit of Roumanian warships to Malta, which is expected to take place in the spring of 1931. In reply, King George expressed the hope that the British visit would deepen the existing good relations between the two countries.

The cruiser Danae, Captain E. R. Bent, D.S.C., was sent from Halifax on September 6 on receipt of the news of the devastation caused in Santo Domingo by the hurricane. She arrived on the 9th, and landed marines and a medical unit to assist the Dominican troops, who had been guarding the city. The Danae also turned over all her medical supplies, apart from those actually needed in case of emergency, and surplus food on board was given to the relief committee. More than 2,000 corpses had been buried or cremated. There were over 5,000 injured, and more than 30,000 homeless.

Meantime, another ship of the Eighth Cruiser Squadron, the Delhi, Captain W. E. C. Tait, M.V.O., proceeded to Dominica, which also suffered damage from hurricane. The Delhi had not long before made a cruise up the Amazon. She left Para on August 28, and arrived at Manaos, a thousand miles up the river, on September 4. It had been arranged for her to remain ten days, but owing to being required for other service she left on the 7th, and reached Para again on September 9, leaving on the 10th for Trinidad.

The recall of the Danae for hurricane duty prevented her making a visit, according to programme, to Newport, Rhode Island, at the time of the yacht races for the America Cup. The sloop Heliotrope, Captain E. R. Corson, M.V.O., D.S.C., took her place, and was off Newport from September 12 to 22. At a banquet given by the citizens in honour of the officers of the Heliotrope, Admiral W. S.

Sims, U.S.N., referred to the close co-operation of the British and United States Navies during the War, which was something unique in the history of all war. Speaking of the co-operation still maintained between the two Navies among the officers, he said it was one of the most potent factors for the peace of the world.

Vessels of the Fishery Protection Flotilla continued their useful work, and no changes were made in the composition of this force. On May 28, 1930, the text was published of a temporary Fisheries Agreement between Soviet Russia and Great Britain. Fishing boats registered in the United Kingdom are permitted to fish at a distance of from three to twelve geographical miles from the northern coast of Soviet Russia and its dependent islands. In the White Sea, fishing may be carried on north of latitude 68 degrees 10 minutes North, outside a distance of three miles from the land. Waters to which the agreement applies are only those between meridan 32 degrees and 48 degrees East longitude. The British Government reserved the right to reopen the question of the limits specified in this agreement.

Early in June there was issued the Report on Admiralty Surveys for 1929, by the Hydrographer of the Navy, Rear-Admiral H. P. Douglas, C.B., C.M.G. During 1929, there were published 58 new charts and diagrams, and 71 plans. Large corrections to chart plates numbered 249, and small corrections 7,632, while no less than 272,741 corrections to charts were inserted by hand. Admiralty notices to mariners published numbered 2,167. Charts printed for the use of the Navy and Government departments were 313,724, and for sale 336,305, the receipts from them being £56,960. H.M. ships discovered 83 new rocks and dangers; 347 were reported by other authorities; and 17 were discovered by vessels striking on them; making a total of 447.

Members of the Historical Association in London for their annual general meeting paid a visit to the Royal Naval College, Greenwich, on January 3, 1930, and were addressed by the President of the College, Vice-Admiral W. H. D. Boyle, C.B. The object of the College, he said, was to provide for the higher education of naval officers in the more scientific part of their profession. It was not only by fighting that the British Navy had won the first place among the navies of the world, but also because it had done more than any other during the last three centuries to help forward the science of navigation and all connected with it. British Admiralty charts were the standard works for all parts of the world. There was no sea that had not been explored by British naval surveyors. The object of maintaining a navy, added Vice-Admiral Boyle, had always been the same, the "protection of public safety," and, since 1694, the year in which that palace was dedicated to naval use, the public safety had been preserved against the efforts of at least three would-be dictators. As historians, the members of the Association would realise how a study of our naval history was synonymous with that of our rise to be a great Empire.

CHAS. N. ROBINSON,
Commander, R.N.

CHAPTER II.

FOREIGN NAVIES.

THE London Naval Treaty ties the British Empire until 1936 as it has never been tied before in the matter of naval strength; but Article 21 of that Treaty contains a safeguarding clause, whereby Britain (in company with the United States and Japan) may, on giving notice to the other partners to this clause, increase her Fleet "if the requirements of national security . . . are materially affected by new construction of any Power other than those who had joined Part III of this Treaty."

In the light of this situation, the expansion of the navies of foreign Powers who have not subscribed to that part of the Treaty must henceforth be a matter of grave concern to our naval authorities. Particularly is this the case at the present, because to invoke this clause, almost before the signatures to the Treaty are dry, might well imperil its whole conception. On the other hand, the naval rivalries between certain nations who are not parties to the limitations imposed by the Treaty seem likely to produce foreign naval forces in the Mediterranean so powerful that we may have to reconsider our position.

It has been emphasised again and again that whereas practically every other naval Power can concentrate its fleet in its home waters without serious detriment to its interests and security, British naval forces cannot be concentrated to anything like the same extent without imperilling the safety of the Empire.

It is already, therefore, a matter of some importance to compare the cruiser, destroyer and submarine strength which we have available to-day in home and Mediterranean waters, with that of the principal Powers on the flank of the sea route which links Britain with the Eastern Empire.

	British Strength in Home and Mediterranean waters.	French Strength in Channel and Mediterranean.	Italian Strength in Mediterranean.	Spanish Strength in Home Waters.*
10,000-ton cruisers . . .	6	4	3	—
Smaller cruisers . . .	31	11	8	6
Flotilla leaders	14	12	22	3
Destroyers	119	64	63	7
Submarines	44	51	42	15

NOTE.—Ships which are only cruising temporarily out of these waters are included in the above.

* Atlantic seaboard and Mediterranean.

TABLE "A"—Warships Completed or Building during 1930.

Navy.	Battle or coast-defence ships.	10,000-ton cruisers.	Smaller cruisers.	Cruiser mine-layers.	Aircraft carriers.	Flotilla leaders.	Destroyers.	Submarines.	Sloops.	Coastal motor-boats.	Gunboats and despatch vessels.	River gunboats.	Submarine depot ship.
British Empire	..	2	3	..	1	2	20	10	7	..	..	1	..
United States	..	12	..	..	1	..	..	5	..	..	..	..	..
Japan	..	4	..	1	1	..	13	7	..	..	..	1	..
France	..	3	1	1	1	16	6	42	4	9	..	..	..
Italy	..	4	6	..	..	3	8	14	..	4	..	..	..
Germany	1	..	2	..	..	..	..	..	..	..	..	..	..
Spain	..	2	1	..	..	6	..	2	..	..	..	..	..
Finland	2	..	..	..	..	..	..	4	..	..	..	..	..
Greece	..	..	..	..	..	..	4	..	..	2	..	..	..
Netherlands	..	..	..	..	..	..	..	9	..	..	..	..	..
Norway	..	..	..	1	..	..	..	..	..	..	1	..	..
Poland	..	..	..	..	..	..	1	3	..	..	..	..	..
Roumania	..	..	..	..	..	..	..	1	..	..	..	..	1
Soviet Union	..	..	..	..	..	..	..	3	..	..	..	..	..
Sweden	..	..	..	..	1	..	2	3	..	..	..	..	..
Turkey	..	..	..	..	..	..	4	2	..	3	..	..	..
Yugoslavia	..	..	..	..	..	1	..	..	..	..	..	..	..
Argentine	..	..	2	..	..	..	..	3	..	..	..	..	..
Chile	..	..	..	..	..	..	..	..	..	..	..	..	1
Paraguay	..	..	..	..	..	..	..	..	..	..	2	..	..
Peru	..	..	..	..	..	..	..	2	..	..	..	..	..
Brazil	..	..	..	..	..	..	..	..	..	33	..	..	..
Colombia	..	..	..	..	..	..	..	..	..	..	3	..	..
Total, exclusive of the British Empire	3	25	12	3	4	26	38	100	4	51	6	1	2

The position at the present time is bad enough ; but a glance at Table A, showing the efforts which continue to be made by foreign Powers, especially in the narrow waters of the Mediterranean, to increase their navies, particularly as regards torpedo craft and submarines, can only lead us to the conclusion that the balance of sea power is rapidly changing to our detriment.

Scarcely less depressing is it to see (Table B) that our resources for building warships are no longer sustained, as they used to be, by foreign orders ; whilst Italy has no lack of customers.

TABLE B.—Number of Foreign Ships Building, Ordered, or Completed in :—

Ordered by	Great Britain.			Italy.						France.		Spain.	Total.
	Flotilla leaders.	Gunboats.	Motor-boats.	Cruisers.	Destroyers.	Submarine depot ships.	Submarines.	Gunboats.	Coastal motor-boats.	Destroyers.	Submarines.	Survey ship.	
Argentine . .	..	..	..	2	..	..	3	..	..	..	..	..	5
Brazil . . .	..	..	33	..	..	..	..	..	..	..	..	..	33
Colombia . .	..	3	..	..	..	..	..	..	..	..	..	..	3
Greece. . .	..	..	..	..	4	..	..	..	..	..	..	..	4
Paraguay . .	..	..	..	..	..	..	..	2	..	..	..	..	2
Poland . .	..	..	..	..	..	..	..	..	..	1	3	..	4
Roumania .	..	..	..	..	..	1	1	..	..	..	..	..	2
Turkey . .	..	..	..	..	4	..	2	..	2	..	..	..	8
Uruguay . .	..	..	..	..	..	..	..	..	..	..	..	1	1
Yugoslavia .	1	..	..	..	..	..	..	..	..	..	..	..	1
Total .	1	3	33	2	8	1	6	2	2	1	3	1	63

The material aspects of sea power, which this analysis of foreign navies brings to light, should give us cause for very serious reflection.

UNITED STATES

Ratification of the London Naval Treaty.

On July 20, the United States Senate approved by fifty-eight votes to nine the ratification of the London Naval Treaty. On the following day the President signed the Instrument of Ratification, and issued a manifesto in which he referred to this " further long step towards lifting the burden of militarism from the backs of mankind, and speeding the march forward of world peace."

The day after this historic event took place, Mr. Adams, Secretary of the Navy Department, announced that the construction already authorised would go on, and that the Department would submit a comprehensive building programme to Congress at the end of the year. Mr. French, Chairman of the Sub-Committee on Naval

Appropriations, has stated that if all the new construction allowed by the Treaty is undertaken, it will cost from 150 to 200 million pounds between this year and 1936.

The effect of the Naval Treaty on the United States Navy may be summarised as follows :—

Battleships.—In common with Great Britain and Japan, the United States will build no new battleships before 1936. The Florida has been decommissioned and will be scrapped ; the Utah has been withdrawn from active service and is to be converted to a wireless controlled target ship ; the Wyoming will be disarmed so that she will only be fit for training purposes.

Cruisers.—The Treaty allows the United States an increase of 217,000 tons in cruiser tonnage ; this means a total tonnage amounting to over three times that of her existing cruisers at the end of 1929. Of this total, 180,000 tons may be utilised in ships of the 8-inch type, the remaining 143,500 tons, making 323,500 tons in all, must be confined to ships with guns of 6-inch or less calibre.

The total permissible number of 8-inch cruisers is eighteen, but only fifteen of these may be completed before 1935. If it is decided to build the three remaining ships, they will be laid down one in each of the years 1933, 1934, 1935. Alternatively, the United States may limit the number of 8-inch cruisers to fifteen, and increase their 6-inch ships up to a total of 189,000 tons. In addition, the Treaty permits of a transfer up to 10 per cent. of the category to which the transfer is being made as between 6-inch cruisers and destroyers.

Aircraft Carriers.—There is no change in the allotted total tonnage of aircraft carriers, 135,000 tons, from that allowed by the Washington Agreement, but the Five Powers have agreed that in future any surface vessel, whatever its displacement, designed specifically and exclusively for carrying aircraft, and so constructed that they can be launched from and loaded on the vessel, will be included in this category. The gun armament is not to exceed 6·1-inch calibre.

The United States has plenty of margin to increase their number of aircraft carriers, as the present ships of that class only aggregate 73,286 tons.

Destroyers.—The Treaty will necessitate scrapping a large number of old destroyers, as the existing flotillas total about 300,000 tons, and this figure must be reduced by one-half, i.e. to 150,000 tons.*

The standard displacement of new ships must not be over 1,850 tons, while not more than 16 per cent. may exceed 1,500 tons. Gun armaments must not be greater than 5·1-inch calibre. It is interesting to compare these restrictions with some of the flotilla leaders constructed lately by France, who is not a party to this section of the Treaty.

Submarines.—Here again, the United States will be called upon to scrap a number of old craft in order to reduce her present total of 80,000 tons to the 52,700 tons allowed by the Treaty.

All five Powers have agreed that in future no submarine shall exceed 2,000 tons or carry a gun above 5·1-inch calibre ; but each may retain not more than three submarines not exceeding 2,800 tons, and armed with guns not above 6·1-inch calibre. This permits the retention of the U.S. submarines V.4, V.5, and V.6, vessels of approximately 2,700 tons, each armed with two 6-inch guns.

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* See also " Cruisers," as regard 10 per cent. permissible transfer of tonnage.

Estimates.

The Naval Appropriation Bill for the fiscal year ending June 30, 1931, was passed by Congress on May 16, without the formality of a vote, and by the Senate ten days later. The latter increased the vote by 97,875 dollars.

The total estimates amount to 380,669,386 dollars, 18,484,359 dollars more than the previous year. This does not include a sum of about £2,000,000 for aircraft. The London Treaty was not considered in framing these estimates, except for a token vote of £80,000 for laying down the third block of five cruisers. This sum has since been deleted.

The personnel (84,500) and the number of ships to be kept in commission for the ensuing year will be much the same as in 1930.

£9,880,000 is allowed for new construction. Of this £2,910,000 is for completing the eight cruisers authorised before February, 1929, and the remainder for the first block of five cruisers, the aircraft carrier, and two of the second block of five cruisers.

Battleship Modernisation.

A sum of £1,390,000 is included in the Estimates for completing the modernisation of the battleships Pennsylvania and Arizona. When this has been done, ten of the thirteen pre-Jutland battleships will have been dealt with; the remaining three fall out of service under the London Treaty.

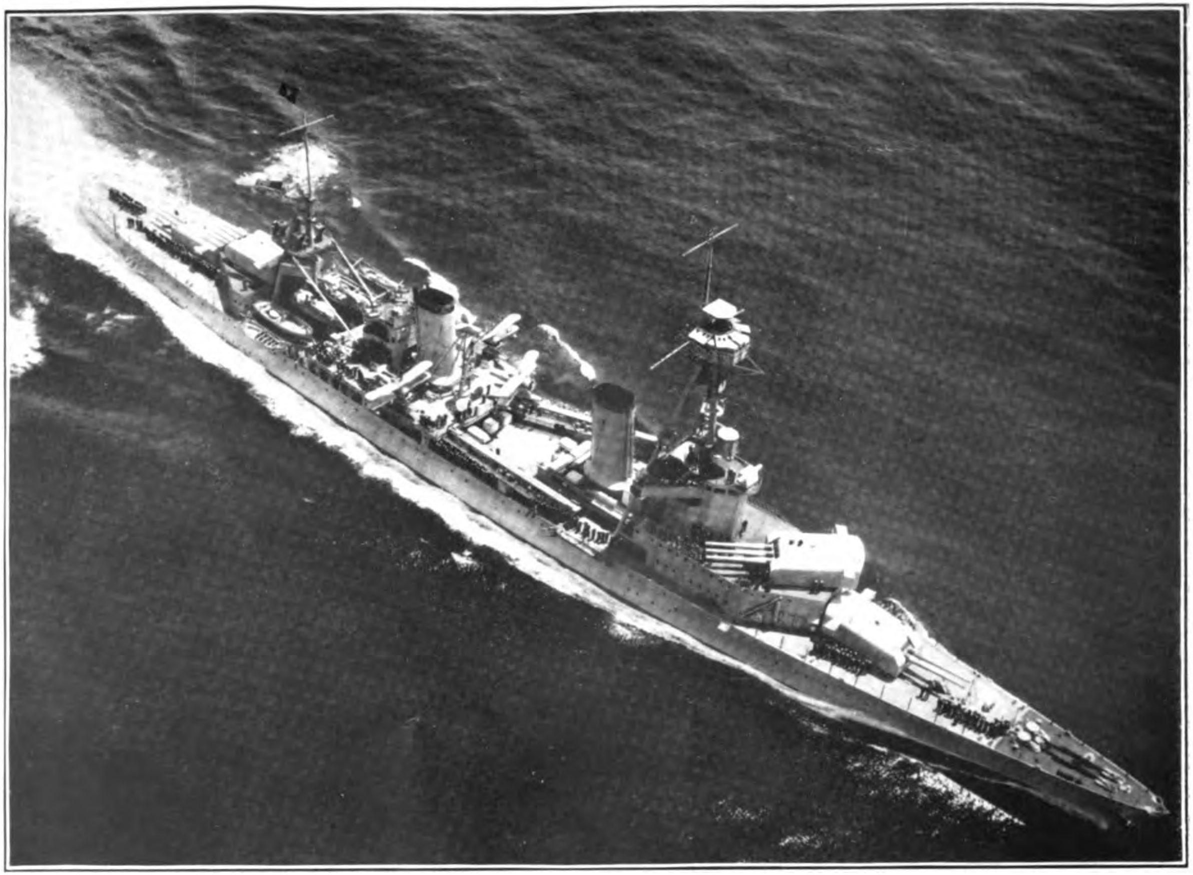
Cruisers.

All the eight cruisers authorised in December, 1924, are due for completion by March, 1931. Five of these ships, the Salt Lake City, Pensacola, Chester, Louisville and Northampton (flagship) will form Light Cruiser Division 5. The Houston is to relieve the Pittsburgh as flagship of the Asiatic squadron in March of next year, and about that time the Chicago will probably replace the battleship Texas as flagship of the C.-in-C., U.S. Fleet, while the Augusta will become flagship of the C.-in-C., Scouting Fleet.

The five 10,000-ton cruisers of the 1928–29 programme have now been allotted names, and are being constructed as follows :—

New Orleans	(No. 32)	New York Navy Yard.
Portland	(No. 33)	Bethlehem Shipbuilding Co.
Astoria	(No. 34)	Puget Sound Navy Yard.
Indianopolis	(No. 35)	New York Shipbuilding Co.
Minneapolis	(No. 36)	Philadelphia Navy Yard.

Three of these cruisers, allocated to private yards, were suspended by President Hoover in 1929 as a friendly " gesture " to facilitate



[*Photo by courtesy of the U.S. Navy Department.*

THE UNITED STATES CRUISER SALT LAKE CITY, 10,000 TONS.

Under way during Review of the Fleet by President Hoover, May 20, 1930.

the convening of the London Naval Conference. Construction is now to proceed on all five ships.

There appears to be an increasing weight of naval opinion in the United States that in future large cruisers ought to be better protected, and it is probable that the new ships will have much thicker armour than that of the "Pensacola" class. As an offset to the increased weight, it is hoped to effect a saving by introducing a lighter design of propelling machinery, using aluminium for furniture, etc., and substituting welding more extensively for riveting.

Various reports have appeared in the Press regarding novel designs for ships which will conform to the Treaty specifications of 6-inch cruisers, but which will carry a number of aircraft. No authentic details are, however, yet available, but it seems probable that, if 6-inch cruisers are built, they will be vessels of at least 9,000 tons.

AIRCRAFT CARRIERS.

The new aircraft carrier is to be a much smaller ship that the Saratoga or Lexington. The displacement will be only 13,600 tons, and, whereas the existing ships carry a complement of 3 cabin officers, 94 wardroom officers, 78 junior officers, 20 warrant officers, 101 chief petty-officers, and 1,826 enlisted men, the new carrier will have a complement of 45 ship's officers, 114 naval aviators (commissioned officers), 36 enlisted pilots, 313 aviation ratings, and 1,018 other enlisted ratings.

The speed will be somewhat less than in the present carriers, and the radius of action will also be reduced. Against this it is reported that by eliminating the "island" structure and developing aviation facilities to the utmost, nearly as many aeroplanes will be carried as in the bigger ships.

The Navy Department has pressed continually for more aircraft carriers, the provision of which is regarded as the most urgent need of naval aviation at the present time.

The importance attached to developing the tactical use of aircraft carriers and to co-ordinating their work with the fleet is shown by the fact that the U.S. Navy has, for some time past, had a flag officer in command of Aircraft Squadrons with the Battle Fleet, while a Captain commands the Aircraft Squadrons with the Scouting Fleet.

SUBMARINES.

The two large submarines V.5 and V.6 are both afloat. These with V.4 already completed make up the quota of these craft which, under the London Treaty, may carry 6-inch guns. They are slightly larger than V.4 and displace 2,760 tons. Their armament is two 6-inch guns and six torpedo tubes. The engines develop 6,000 h.p., which is designed to give a surface speed of 17 knots. Each vessel carries eight officers and eighty men. The cruising radius is reputed to be about 20,000 miles.

A number of submarines will be due for scrapping under the Treaty, and the following have already been struck off the effective list:—N.1, N.2, and N.3 (1917); H.4, H.5, H.6, H.7, H.8, H.9, O.1, O.2, O.11, O.12, O.13, O.14, O.15, O.16 (1918); R.21, R.22, R.23, R.24, R.25, R.26, R.27 (1919); S.2, T.1, T.3 (1920); S.49, S.50, S.51, T.2 (1922).

NAVAL AIR SERVICE.

Great as the efforts of the United States are to increase their surface navy, they are entirely eclipsed by their achievements in equipping their fleet with a Naval Air Service which is approximately seven times the strength of the British Fleet Air Arm. In the annual report of the Bureau of Naval Aeronautics, Admiral Moffet, the head of the Bureau, stated that in June, 1930, the U.S. Navy already had 829 aircraft of the most modern types.* It has been stated in Congress that by 1931 this number will have been increased to 1,007 machines, while the personnel will include 1,007 pilots and 70 naval reservists. Nearly forty U.S. warships now carry aircraft and have means for flying them off.

The first of the two large rigid airships building to the order of the Navy Department has been named the "Akron," and is to be ready for trials by July, 1931. The second is due for completion by the end of 1932. Both airships are being built essentially for naval uses, and it is reported that they will each carry five aeroplanes in an external hangar. One is to be stationed on the East, and one on the West coast.

PERSONNEL.

A number of changes in the higher commands have taken place in the past year. Amongst these the following are the most important:—Admiral Hughes, Chief of Naval Operations, has retired, and Admiral Pratt, C.-in-C. of the U.S. Fleet, has succeeded him. The latter has been relieved by Rear-Admiral Chase, who has been given temporary rank of Admiral. Rear-Admiral Schofield has been made C.-in-C. of the Battle Fleet, with temporary rank of Admiral. Another important appointment is that of Rear-Admiral Reeves to the Aircraft Squadrons of the Battle Fleet in succession to Rear-Admiral Butler, who exchanges with him on the General Board.

JAPAN.

THE LONDON NAVAL TREATY.

The Emperor formally ratified the London Naval Treaty on October 2, 1930, after it had been presented to him by the Prime Minister, with a request, signed by the whole Cabinet, that this should be done. There can be little question that professional opinion generally was strongly opposed to the Treaty. Admiral Kato, Chief of the Naval Staff, resigned as a protest against ratification. The day after the signing of the Treaty, Admiral Takarabe, the Minister of Marine, resigned, giving age and ill-health as his reasons. Both

* This compares with 135 aeroplanes of the British Fleet Air Arm at the same date.

these high officials were promptly appointed members of the Supreme War Council.

Admiral Kato was relieved by Admiral Taniguchi, previously Commander-in-Chief at Kure; and Admiral Takarabe by Admiral Abo.

It is not too much to say that in naval circles in Japan, the terms of the London Naval Treaty have been viewed with misgivings second only to those in this country. There, too, it is felt to be galling in the extreme that a nation to whom sea security is so vital should have her hands tied, even if economic necessity may restrict naval expenditure at the moment.

As regards capital ships, Japan is not called upon to make any appreciable sacrifice. One battle cruiser, the Heyei, completed in 1914 and not modernised, must be rendered non-effective, thereby reducing the number of that category to twelve as compared with the fifteen which are to be retained by Britain and the United States. Japan, in company with the other two nations, is pledged by the Treaty not to build any new capital ships before 1936.

The cruiser allowance is 108,400 tons, or twelve ships, in the 8-inch class, and 100,450 tons for ships of the 6-inch class.* Should the United States lay down in 1933 and 1935 the three ships to complete the full number of eighteen to which they are entitled, Japan may advance a claim at the Conference to be held in 1935 to an increase of 8-inch tonnage.

As regards aircraft carriers there is no change from the tonnage allowed by the Washington Conference: 81,000 tons for Japan as compared with 135,000 tons for Britain and the United States. Restrictions as regard armament, etc., are as already described under "United States."

Japan's destroyer allowance is 105,000 tons as against the 150,000 tons of the other two navies.

A firm stand was made by her delegates at the Conference for "parity" in submarine tonnage, which is fixed at 52,700 tons for three Powers.

The Treaty, so far as it affects Japan, will call for a reduction of existing tonnage in all the principal classes of warships except aircraft carriers. In the latter, she, in company with the other Powers, has not yet built up to the Washington quota.

NAVAL PROGRAMME.

The cost of the necessary replenishments to bring the fleet up to the standard allowed by the London Treaty has been estimated to be £90,000,000. This represents an increase of £40,000,000 over the ordinary expenditure, even if it is spread over the next five or six years. In view of the stringent measures which have been taken of late to reduce national expenditure, it remains to be seen whether these naval requirements will be met in full.

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* As compared with: British Empire, 146,800 tons for fifteen 8-inch ships, and 192,200 tons for 6-inch ships; and U.S.A. 180,000 tons for eighteen 8-inch ships and 143,500 tons for 6-inch ships.

See United States "Cruisers" for 10 per cent. permissible transfer of tonnage, which also applies to Japan.

As regards existing capital ships, it is reported to be the intention to speed up modernisation, which, following the practice in the U.S. Navy, is to include increased elevation for the main armaments.*

With the completion of the four 10,000-ton cruisers now building, Japan will have her full quota of that class under the London Treaty; but she will require to build a number of 6-inch ships, destroyers, and submarines for replacement purposes, while she has sufficient margin to build one or two small aircraft carriers.

The design of the new 6-inch cruisers is likely to give rise to considerable controversey, and will probably be influenced by new construction in other navies. In spite of many and varying reports, no authentic details are yet available regarding such ships.

CRUISERS.

Construction of the four new cruisers is proceeding steadily. The Atago and Takao were launched at Kure and Yokosuka respectively early in the year, and the Chokai building at Nagasaki and the Maya at Kobe were due to take the water before the end of 1930.†

The more extensive use of electric welding is reported to have effected appreciable saving in the cost of the Atago as compared with the Takao.

AIRCRAFT CARRIERS.

The new small aircraft carrier building by the Yokohama Dock Company is to be called the Ryujo. As in the case of other new construction, electric welding is, it is reported, to be used extensively. The ship will probably be completed by the Yokosuka Naval Yard.

It is understood that, if funds are available, existing aircraft carriers are to be modernised as part of a scheme for improving and increasing the naval air service.

DESTROYERS.

The programme of new destroyers is progressing, and the majority of the five vessels laid down in 1928 are in commission.

Electric welding, which was tried experimentally in the Yugiri, has proved so successful that it is also to be used in the Hibiki and Sazanami. Workmen have been sent from the Yokosuka and Kure dockyards (to the United States) to study the process.

It is reported that the policy of the Naval General Staff is to ensure that there will be a force of eighty-two destroyers available by 1937.

SUBMARINES.

The three submarines I.59, I.62, and I.64 laid down in 1927, have all been completed during the past year.

As regards future construction, submarines of small displacement —about 750 tons—seem to be favoured.

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* No British capital ship has had the elevation of her main armament increased.

† The Maya was launched on November 8, 1930.

Naval Air Service.

It appears to be the policy of the Naval General Staff to endeavour to make up for what they regard as serious deficiencies which will be the outcome of the London Treaty, by greatly increasing the strength of the naval air force.

The new naval flying station at Tateyama, near Tokyo, has been completed.

Early in the year the aircraft carrier Kaga relieved the Akagi in the 1st Aircraft Carrier Squadron, and was completed with her complement of fifty aeroplanes. The Akagi although officially placed in the Reserve at Yokosuka, continued to carry out training work off that port.

All submarine squadron flagships are being supplied with reconnaissance machines.

A new non-rigid airship—No. 9—of the S.S. type, has been completed for the Japanese Navy. She is reported to be similar to her predecessor—No. 8 (270 feet long, 265,000 cubic feet, and driven by two 150 h.p. Benz engines).

Personnel.

In the early part of the year the Japanese Government made a proposal to reduce the pay of naval officers. This was met by such a firm stand on the part of the Navy Department, that it was dropped.

FRANCE.

The naval activities of France have, of late, been inspired largely by a certain feeling of apprehension in regard to those of her near-by neighbour in the Mediterranean. It was due to the inability of France and Italy to agree to any relative standard of strength, that neither country would subscribe to the section of the London Naval Treaty which imposed limitations on warships other than those affecting capital ships and large aircraft carriers already dealt with in the Washington Treaty. Although intensive competition has been checked for the moment by diplomatic discussions, the latter have not, as yet, led to any better understanding.

Another source of disquietude to France is the progress of Germany's miniature battleship, for it is clearly realised that there does not exist in her present navy any ship capable both of catching and fighting this novel and powerful vessel. Tentative proposals for the construction of a battleship capable of dealing with the German ship have been advanced on several occasions, but a decision has been deferred until 1931, doubtless for financial reasons, and also with a view to gaining more time for working out details. It is interesting, however, to note that in spite of the fact that the Versailles Treaty was intended to render Germany innocuous as a naval Power, constructive enterprise is already making her a factor to be reckoned with.

ESTIMATES.

The Navy Estimates for 1930 amounted to 2,722,741,389 francs, or nearly £22,000,000; approximately £2,000,000 more than in the previous year. In June the Government expressed their intention to ask the Chamber for a supplementary credit of about £8,000,000 for national defence generally, but in order to help the resumption of the Franco-Italian conversations, this further expenditure, so far as it was to be devoted to laying down additional warships, was deferred.

BATTLESHIPS.

Each of the 23,000-ton ships is being taken in hand in turn, reconditioned and converted to burn oil fuel. Work on the Paris and the Courbet is completed, and the Jean Bart is expected to be ready early in 1931. The Lorraine has been taken in hand.

CRUISERS.

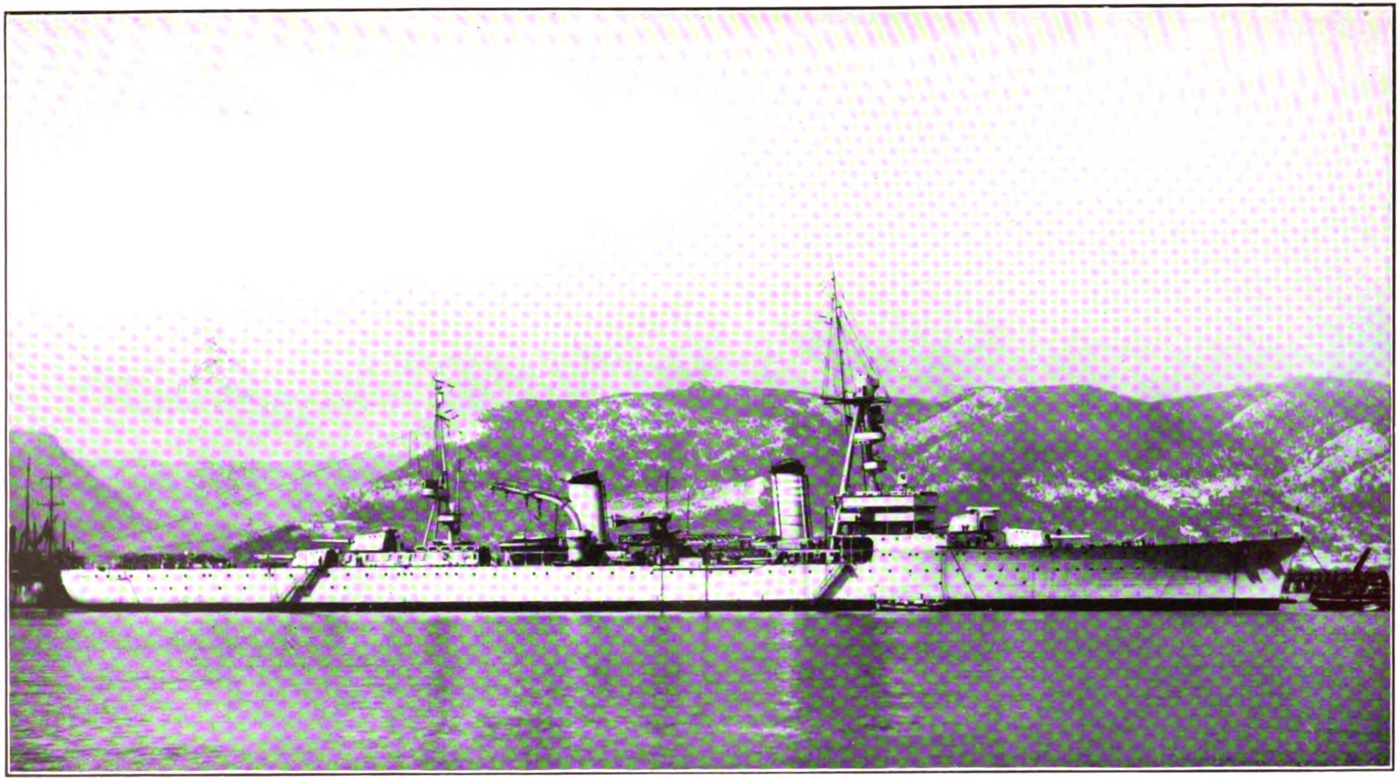
The last of the six original 10,000-ton cruisers, the Dupleix, was launched in October, 1930. The first of a new class, the Algérie, was due to be laid down in December. She will differ in many respects from the earlier ships, and the single funnel and flush deck will give her a very different appearance. Speed is to be sacrificed for armour sufficient to keep out the shell of guns of the same calibre as her own, and will be a maximum of 32 knots. Her armament will consist of eight 8-inch, in four double turrets, eight 3·9-inch H.A. guns, eight 1·5-inch machine guns, two 21·7-inch triple torpedo tubes. Welding is to be used extensively in place of riveting.

The training cruiser Jeanne d'Arc is due for completion early in 1931. She will have accommodation for twenty instructional officers and 156 cadets, in addition to her own complement. She is designed with a view to her being of practical use in time of war.

FLOTILLA LEADERS.

France, not being a party to Part III of the London Treaty, is not tied by the clause limiting the displacement of destroyers to 1,850 tons and their armament to 5·1-inch guns, and is developing a type which is already the most powerful torpedo-craft in the world. Where the newest and largest British flotilla leaders displace 1,500 tons, and are armed with five 4·7 guns, France has twenty-four of these vessels built and building, displacing well over 2,000 tons, and armed with five 5·5-inch guns.

The six vessels of the new "Albatros" class now building represent a still further advance on the "Lion" class. They will displace 2,440 tons, carry five 5·5, one 3-inch, and four smaller A.A. guns, and have a speed of 37 knots, compared with the 36 knots of the previous class. A still later class, to be laid down in 1931, is, it is reported, to displace 2,690 tons.



[*Photo by courtesy of the French Ministry of Marine.*

THE FRENCH CRUISER COLBERT, 10,000 TONS.

Completed at Brest, 1930.

In answer to a question in Parliament, Mr. Alexander agreed that any vessels we might construct of equal power to these French flotilla leaders would have to come out of our quota of cruisers.

SUBMARINES.

At the London Conference, France stoutly resisted all proposals to abolish submarines, but in company with the other four Powers has agreed in future not to build under-water craft of more than 2,000 tons, or to arm them with guns of more than 5·1-inch calibre; but, by a special proviso, one of the three largest submarines which each nation may retain, includes in her case the Surcouf, the largest submarine in the world, displacing 3,250 tons on the surface and 4,300 submerged. This craft is armed with 8-inch guns, has a surface speed of 18 knots, and a submerged one of 10 knots. At the beginning of the year France had no less than forty-six submarines, 1st and 2nd class, building, besides the Surcouf, while she already possessed fifty-five ocean-going and thirty-three coastal submarines.

GENERAL.

In March, 1930, M. Dumesnil replaced M. Leygues as Minister of Marine. There was general regret in naval circles at the departure of the latter from office. Under his regime the French navy enjoyed a continuity of policy which it had not known prior to his arrival in the Rue Royal in 1922. He has been largely responsible not only for the steady modernising of the fleet, but also for a thorough overhaul of naval administration.

The effective personnel in 1930 was estimated to be 58,500, which is 1,000 more than in the previous year; the number includes 500 attached to the Air Ministry.

A Naval College for training Cadets is being built on the Plateau des Quatres Pompes, overlooking Brest harbour. Up to 1914, Cadets were housed on board the Boarda, and when that ship was worn out, they moved to barracks at Brest. Sea-going experience is, however, to be provided as, in addition to the training cruiser Jeanne d'Arc, a large sailing ship is being acquired. This will accommodate about half the Cadets of a term, and take them for extended cruises in European and African waters.

The armoured cruiser Edgar Quinet, launched in 1907, grounded off Cape Blanc, twenty miles west of Oran in Algeria, on January 4, 1930, and five days later sank.

ITALY.

Italy's attitude towards the London Treaty was summed up in a single phrase in her Memorandum: "Italy is prepared, *à priori*, to accept as the limit of her armaments any figure, no matter how low, provided it is not exceeded by any other Continental European Power." This comparison applies particularly to France. The

Italian claim for "parity" with her neighbour is based on the contention that, whereas the Atlantic is a source of traffic and life to France in time of war, the Mediterranean is a perpetual trap. As regards the French contention that that country has two sea fronts to guard, the reply is that Italy also has a second naval front owing to an "unjust peace" having left the Dalmatian Archipelago in foreign hands. As France will not accept this line of argument, and negotiations between the two countries on the subject of naval strength have so far been at a deadlock, Italy claims that she has no choice but to endeavour to reach "parity" by increased construction; a course she can ill afford to take.

ESTIMATES.

Naval Estimates for 1930–31 amounted to about £15,000,000, an increase of some £2,600,000 on the previous year. Of this increase £2,150,000 is earmarked for new construction. In addition, and following the action of the French Government in proposing to ask for a supplementary vote of £8,000,000, the Italian Government on June 20, decided to increase their defence expenditure by £5,500,000, of which £1,000,000 was ear-marked for the navy. But, as a preliminary to further negotiations between the two Governments, this was dropped for the time being.

In his speech to the Chamber on the Estimates, Admiral Sirianni said that there were under construction: four 10,000-ton, and six 5,089-ton cruisers, twelve flotilla leaders, eight destroyers, and fifteen submarines. The new programme, which has been deferred, under the Franco-Italian undertaking not to lay down any new warships before the end of 1930, included one 10,000-ton 8-inch and two 5,000-ton 6-inch cruisers, four destroyers of 1,240 tons, four submarines of 1,390 tons, six of 810 tons, and twelve of 600 tons. Meanwhile the existing programme has been expedited. A remarkable Italian "gesture," in view of the success, so loudly proclaimed in Britain and the United States, of the London Naval Conference as a great step towards international disarmament, was the launching on one day—Sunday, the 27th April—of five warships for the Italian Navy; these included two 10,000 and two 5,000-ton cruisers, and a submarine.

CRUISERS.

Progress towards completion of the two ships of the "Zara" (10,000 tons) class, and four ships of the "Alberto di Guissano" (5,000 tons) class, has proceeded steadily. It is reported that the Alberto exceeded her designed speed of 37 knots by 2 knots on trials.

The report in November, 1930, that a new 10,000-ton cruiser, the Pola, better protected and to be armoured against 8-in. shell, had been ordered at Leghorn was not confirmed.

DESTROYERS.

It is claimed that the Nicoloso da Recco, one of the twelve flotilla leaders laid down in 1927, created a world's record for her class on trials by steaming 41·504 knots. In a six-hour trial she comfortably exceeded the contract speed of 38 knots.

The new flotilla leaders will, it is reported, be built to designs which will challenge their French contemporaries. The displacement will be nearly 3,000 tons, the speed nearly 40 knots, and they will carry five or six 5·5-inch guns and a very powerful torpedo armament.

SUBMARINES.

In spite of the apparent readiness displayed by Italy, during the early stages of the Conference, to agree to the abolition of submarines, Admiral Sirianni has since declared them to be a necessary factor in defence, and has emphasised the importance of pressing on with a considerable programme of construction.

In May, 1930, the submarines E.Toti and D. Millelire, of 1,368 tons, returned from a cruise of 7,000 miles, during which the latter on one occasion remained under water for thirty-six hours.

GERMANY.

NAVAL PROGRAMME.

The Naval Estimates for 1930 amounted to 194,000,000 marks, about £7,700,000, as compared with £10,150,000, to which they had swelled in 1929. This figure was reduced by a sum of 2,900,000 marks, which had been included for commencing armoured-vessel "B." This item was rejected by the Budget Committee of the Reichstag by a small majority. But the Budget for 1931, submitted to the Reichstag on November 4, contains the outline of an extensive naval programme, which includes proposals to complete three, and lay down a fourth 10,000-ton armoured ship during the six years 1931–1936. The Ersatz-Preussen, building at the Deutsche Werk Yard at Kiel, is due for completion in 1932, and is expected to cost £3,750,000. It is proposed to lay down the Ersatz-Lothringen at the naval dockyard at Wilhelmshaven in 1931, for completion in 1934, and the Ersatz-Braunschweig in 1932 for completion in 1936. The fourth ship, the Ersatz-Elsass, will not be laid down until 1936.

The fifth of the replacement cruisers, the Leipzig, now building at Wilhelmshaven, is due for completion in 1931. It is proposed to build four reserve destroyers between 1934 and 1936, five motor patrol boats and seven boom-defence craft in 1931 and 1932, and five torpedo-boats, the latter not to be laid down before 1936. A gunnery school ship, the Ersatz-Drache, is to be completed in 1931, and it is proposed to lay down a second vessel of this type, the Ersatz-Hay, in 1936.

It remains to be seen, however, whether the new Reichstag will be more favourably disposed towards modernising the German fleet than the last assembly.

Battleships.

The old battleship Hanover has been modernised on the same lines as the Schleswig-Holstein and the Schleisen by the replacement of her 6·7-inch guns with more modern 5·9-inch weapons, and by fitting a new mast with up-to-date fire control gear.

General.

Early in 1930 it was decided to abolish the old system whereby the fleet was divided into a North Sea and a Baltic force, based respectively on Wilhelmshaven and Kiel, and linked by the Kaiser Wilhelm Canal. In future the main fleet will be based on the Baltic port. A Vice-Admiral is now in command of the fleet as a whole; under him is another Vice-Admiral commanding the battleships, and a Rear-Admiral commanding the auxiliary units.

Besides facilitating training, the change is dictated by political considerations. The Minister for National Defence stated at the time that it was the duty of the fleet to maintain communications with Germany's easternmost Prussian province, isolated from her by the Polish Corridor, to co-operate with land forces in the event of attack from the East, and to " keep the Baltic free."

During the summer, and for the first time since the War, a German Squadron entered the Mediterranean on what was avowedly a propaganda cruise. The squadron included four battleships, a cruiser, and nineteen torpedo boats. Some twenty Spanish, Portuguese, Italian, and Grecian ports were visited.

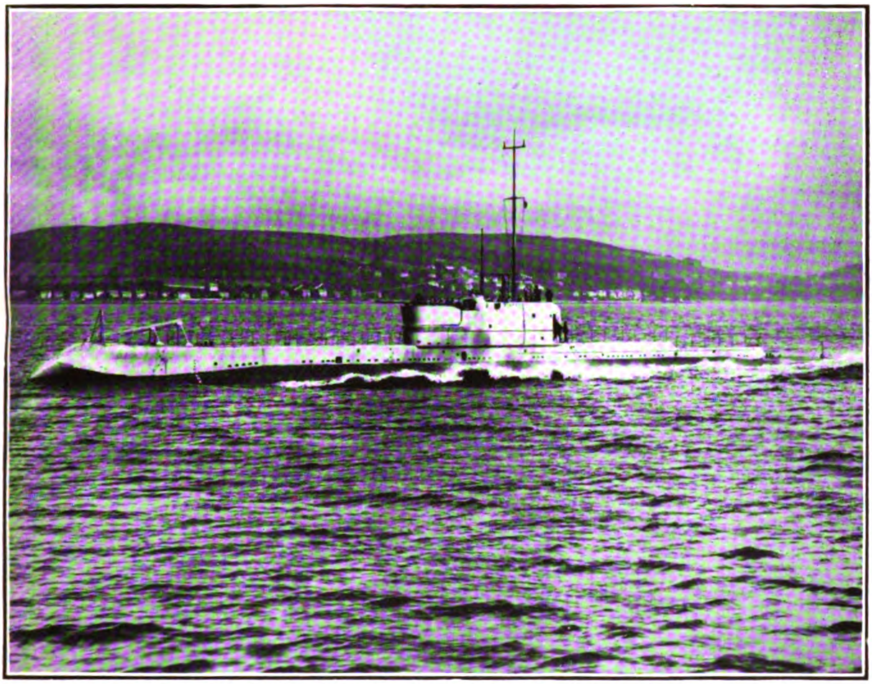
SPAIN.

Naval Programme.

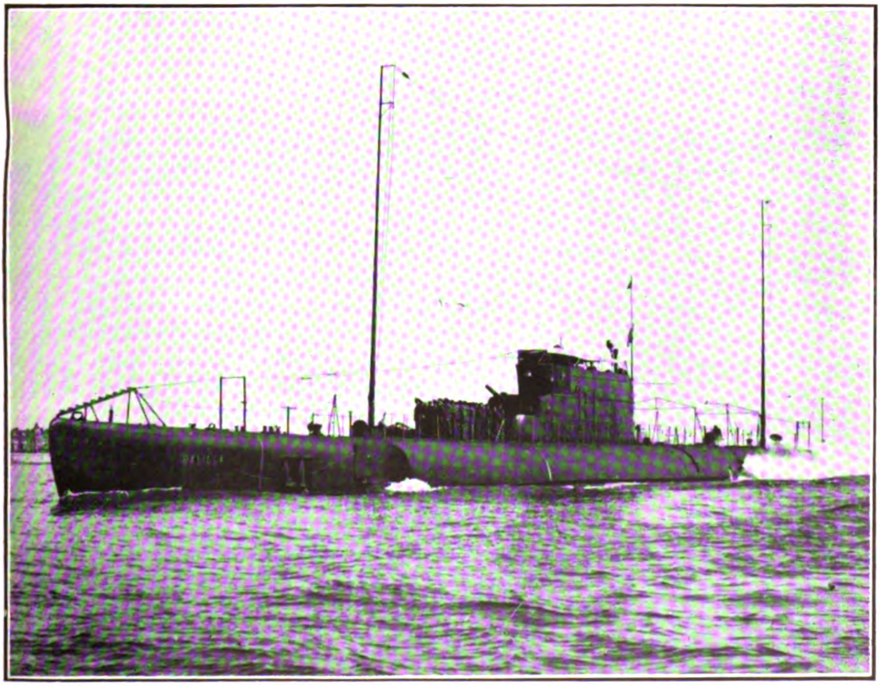
At the end of 1929 the Minister of Marine stated that, although it was not intended to reduce the naval programme, yet new construction would be spread out over a longer period. Thus the cruisers Canarias and Balcares, which were due for completion in 1932 and 1933 respectively, will not be completed until 1935 and 1936. Of the twelve submarines which it was intended to lay down in 1930, only five are to be proceeded with. Deliveries of the eight destroyers which have been ordered will not be required before 1938. In spite of this slowing down in the building programme, the estimates for 1930 were 109 million pesetas as compared with 108 million in 1929.

Battleships.

The Minister of Marine has stated that it is unlikely that any new battleships will be built for Spain for some time; nevertheless preparations are being made at Cartagena for the construction of a dry dock large enough to take a 35,000-ton battleship, while at Ferrol a commercial company have lengthened their building slips, involving an outlay which it is unlikely they would have incurred unless there were some prospect of remunerative orders.



THE CHILEAN SUBMARINE ALMIRANTE SIMPSON, 1,520 TONS.
(By courtesy of the builders, Vickers-Armstrongs, Ltd.)



[Photo by Stephen Cribb, Southsea.

THE ITALIAN SUBMARINE BALLILA, 1,368 TONS.
On a visit to Portsmouth, September, 1930.

CRUISERS.

The two 10,000-ton cruisers are under construction at Ferrol; one was due to be launched before the end of the year, the second should take the water in 1931. The 7,800-ton cruiser Miguel de Cervantes was completed in March, but in the following month she broke from her moorings in a high wind, collided with the quay and sustained considerable damage. On trials this ship attained a maximum speed of 35·58 knots, and on a four hours run her average speed was 33·99 knots.

PERSONNEL.

In June, 1930, the Infante Don Juan, third son of King Alfonso, passed the entrance examination and entered the Navy as a Naval Cadet.

The number of Flag Officers is being reduced from twenty-four to eighteen, and of Captains from forty-eight to forty-two. In the non-executive branches grades corresponding to those of Vice- and Rear-Admiral have been abolished and the highest relative rank is now that of Captain. Small increases have been authorised in the number of junior grades and, in order to meet the manning requirements of new ships, the strength of the personnel of the navy as a whole is to be increased to 14,000.

OTHER FOREIGN NAVIES.

EUROPEAN.

DENMARK.

Denmark's small naval forces are being further reduced. The old third-class cruiser Hejmdal is being scrapped, and the Minister of Defence has notified a reduction of forty officers and a hundred men. In the case of long service men this represents about one-third the number allowed in the current Estimates.

Except for one coast defence ship and the submarines, the fleet is only commissioned for about four months in the year, and during the summer training, officers employed at the Admiralty have to be lent to the ships to make up complements. It is not clear what will be done when the reductions have taken effect.

New Construction.—The torpedo-boat Hvalen, which is being built in Copenhagen Dockyard, was launched on June 13.

FINLAND.

Finland is proceeding steadily with the creation of her small fleet. The Defence Budget for 1930 includes the following provision for naval purposes :—

	£
Ordinary expenditure	27,500
Extraordinary expenditure	293,250
	£320,750

In the second category is included a sum of £268,750 for new construction. In addition a sum of £20,000 has been granted for the purchase of a sailing training ship.

The Minister of Defence has proposed to build a few small gunboats for coast defence. The two already provided for are vessels of 4,900-tons and they are to be built in Finish ports.

Three of the four submarines building have been launched.

GREECE.

New Destroyers.—An order has been placed in Italy for two more destroyers. These will probably be sister ships to the two already building in the Odero Shipbuilding Yard at Genoa. The latter are vessels of 1,450 tons and are designed to have a maximum speed of 40 knots.

NETHERLANDS

The Dutch Navy continues to be the object of acute political controversy, and the Socialists promoted strong opposition to a Supplementary Credit of £385,000 asked for by the Minister of Defence.

In a memorandum the Minister explained that a sum of £28,350 was required as a first instalment for a new cruiser for the East Indies fleet. It was decided in 1927 that that fleet should consist of two cruisers, eight destroyers, and twelve submarines, all of which were due on the station by the end of 1930. It is now desired to create a reserve for this force to allow for refits, and to increase it by one cruiser, four destroyers, and six submarines.

The projected cruiser is to be smaller than the Java, and to carry an armament of six 5·9-inch guns. The designed speed is 32 knots. The destroyers and submarines will, it is proposed, be similar to existing types. The destroyer Van Ness, the last of her class, completed successful trials on the Clyde in November, 1930. A photograph of the De Ruyter, a sister ship, appeared in the 1930 "Annual."

In home waters the coast defence ships Jacob von Heemskerck and Hertog Hendrick will soon have to be replaced.

Two flotilla leaders are projected, one to be laid down in 1931, and the second on her completion in 1935.

The Estimates also include a first instalment of £43,350 for a new gunboat destined for the West Indies. Her main armament will be three 5·9-inch guns and her speed 15 knots.

NORWAY.

Naval Policy.—The Government has proposed a drastic reorganisation and reduction of the Navy, which is in marked contrast with the programme projected in 1927. No action had been taken when the Sterling rose for the summer recess; it was not to meet until 1931, after a general election.

If this proposal is then passed, it will mean that the Navy is reduced to little more than a coastguard force. New construction, to be spread over a number of years, will provide for four small sloops, ten small torpedo craft, a similar number of small submarines, and a few minelayers. These will, in due course, entirely replace Norway's existing fleet, including the four old coast defence battleships, obsolete torpedo craft, and minelaying gunboats.

The object in view is to create a small but efficient force, instead of continuing to maintain a navy which, however well it may look on paper, has no great fighting value. The sum voted for naval expenditure in 1929–30 was approximately £662,000 as compared with £686,000 for the previous year.

New Construction.—A new minelayer and training ship has been laid down. This ship will be 310 feet long by 35 feet beam, and have a draught of 10 feet and a speed of 20 knots. Her armament will be four 4·7-inch guns, an A.A. gun, and twin 17-inch tubes ; and she will be able to carry 280 mines.

POLAND.

During 1930, volunteers between the ages of eighteen and twenty were taken into the Navy. These young men have to engage for four years and three months, of which two years and three months count as their obligatory military service. They do their normal military training after which they are sent to naval specialist schools, and then to petty-officers' schools. On passing out of these schools, they undergo practical training afloat.

Construction on the vessels building for Poland in France has proceeded steadily, and the Zbyk, the last of the three submarines building at Blainville, was launched in June, 1930. The destroyer Burza, also building at this port, has gone to Cherbourg to receive her armament and to carry out trials.

PORTUGAL.

The Minister of Marine has announced the decision of the Government to proceed with a plan for naval reorganisation. This is intended to be carried out in several instalments, to be spread over a number of years. In all, the expenditure which will be involved has been estimated at £12,000,000.

The first instalment includes the construction of the following units :—

Two 1st class despatch vessels of about 2,000 tons,
Two 2nd ,, ,, ,, ,, 1,000 ,,
Four destroyers of 1,500 tons,
Two submarines of 800 tons,
One aircraft carrier with 12 aeroplanes,
Two fishery patrol boats,

and the requisite aviation material, torpedoes, mines, and munitions. Provision has been made to enable these units to be completed within three years. Tenders were called for in November, 1930.

A second instalment will consist of :—

One light cruiser of 5,000 tons,
Two destroyers,
Four submarines.

Other similar units, to include a second light cruiser and a submarine depôt ship, are visualised for later periods.

RUMANIA.

A British Naval Adviser.—In April, 1930, Rear-Admiral R. G. H. Henderson, C.B., went to Bucharest, at the invitation of the Rumanian Government, to advise them in regard to the construction of a naval base on the Black Sea, and naval policy generally. He was received by Dr. Maniu, the Prime Minister, and subsequently by King Carol, on the latter's return to the capital. Admiral Henderson, having presented his report, returned to England in June.

SOVIET UNION.

The reinforcements sent from the Baltic to the Black Sea at the end of last year, in the shape of the battleship Pariskaia Kommuna and the cruiser Profintern, have caused considerable apprehension in Turkey and the smaller coastal Powers, like Rumania, Bulgaria, and Greece ; especially as there have been rumours of the transfer of a further considerable number of ships.

Various reasons for this concentration have been advanced. The Soviet Government stated originally that the two ships were sent to the Black Sea for repairs and that they would return to the Baltic in April ; but this has not been done, and it was probably never the intention. Possibly the reconditioning of the Yavouz (ex-Goeben) by Turkey may have some bearing on the matter. A more likely explanation is that the Government feared that the local units were becoming contaminated with the anti-Moscow spirit which is very prevalent in the Ukraine. It has even been reported that a naval mutiny was feared by the Southern authorities. The Baltic crews are regarded as being staunch supporters of the Communist state.

Some question has been raised as to the right of the Soviet to send their ships through the Dardanelles. The passage of men-of-war through the Straits is governed by a Convention attached to the Treaty of Lausanne of 1923. Responsibility for giving effect to this is vested in an international body called the Straits Commission, whose headquarters is in Constantinople. This Commission, however, cannot forbid the warships of countries bordering on the Black Sea from passing the Straits ; it can only prohibit a nation which has no coastline on that Sea from sending there a fleet superior to the strongest fleet already in those waters.

Apart from this, the Soviet is not a party to the Treaty of Lausanne.

SWEDEN.

The Naval Estimates for 1929–30 amounted to 45,226,350 crowns as compared with 40,000,000 in the previous year.

The plans for the cruiser aircraft carrier authorised as long ago as 1927 have at last been approved, and an order for the ship has been placed with the Gota-Verke at Gothenburg. She will be a small vessel of about 4,800-tons, capable of carrying eight aeroplanes, and fitted with two catapults ; she has no landing-on deck.

The coast defence ship Gustav V has been modernised and refitted.

TURKEY.

The Yavouz (ex-Goeben) after being seriously damaged in the Dardanelles operations during the War, and endangered by the collapse of the floating-dock in which she was more recently placed for repairs, has at last completed an extensive refit, and has carried out trials which are said to have been satisfactory. The work of reconditioning the ship has been effected under a contract signed with a French firm in 1927.

In March last a contract was signed for the construction in Italy of two more destroyers. The total cost is estimated at about £645,000, and the vessels are to be completed in twelve months. They will probably be similar to the two ships of the " Navigatore " class already building for the Turkish Navy in that country.

SOUTH AMERICA.

ARGENTINE.

The Argentine Navy lives a somewhat hand-to-mouth existence, as for a number of years no detailed estimates have been voted. In 1926 the Government voted £15,000,000 for new construction, to be spread over a considerable period, in the proportions: £7,000,000 up to the end of 1928 ; £4,000,000 up to 1932, and a similar sum up to 1936. This vote is additional to the ordinary estimates.

The new cruiser Venticinco de Mayo, built at Leghorn, has completed her trials. In bad weather, she attained a speed of 32½ knots. She displaces 6,495 tons, and has geared turbines developing 85,000-h.p. The armament consists of six 7·5-inch, twelve 4-inch A.A. guns, and six pom-poms, together with six A.W. torpedo tubes. Her complement is 600 officers and men.

A sister ship, the Almirante Brown, was nearing completion at Sestri Ponente in November, 1930.

Three submarines, the Salta, Santa Fe, and Santiago del Estero, are also building in Italy.

In the process of reorganising the administrative machinery of the Navy, naval aviation has been divided into two regions for purposes of command. There are two bases: a coastal one at

Puerto Belgrano, and an inland training establishment at Punta Indigo. British aircraft are used extensively at both stations.

BRAZIL.

Naval Estimates for 1930 ammounted to approximately £4,176,380; an increase of £277,360 on 1929. This does not include provision for new construction, the cost of which is voted as occasion arises.

A flotilla of thirty-three motor-boats is on order from the British firm of Messrs. J. W. Brooke and Co., of Lowestoft. Thirty of these craft are 30 feet in length, and have a speed of 23 m.p.h.; the remaining three are 44 feet long, and have a speed of 20 m.p.h. They are, it is understood, intended for the suppression of contraband traffic in Rio Bay.

CHILE.

British Naval Mission.—Captain W. L. Jackson, D.S.O., R.N., who as a Commander was a member of a former Naval Mission, has again been lent to the Chilean Government as the senior officer of the new Mission.

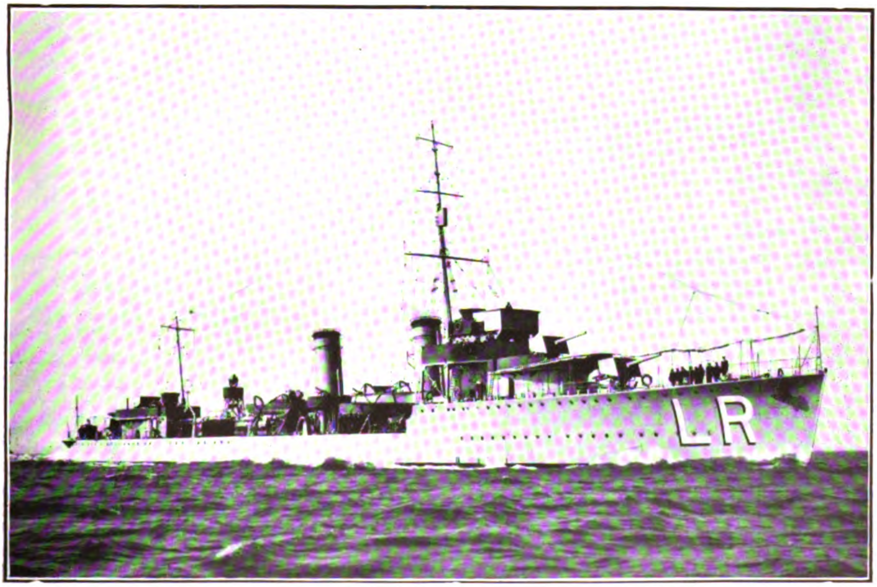
A Separate Air Service.—By a decree promulgated in April, the Army and Navy air arms have been separated from their respective Services and placed under a Secretary of State responsible to the Ministry of the Interior. Officers have been given the option of remaining in the new Air Force, or returning to the Army or Navy. The whole project seems to have been due to political and personal intrigue, as there can be no justification for the expense involved in independent administration for a Service of such small dimensions; while from the point of view of efficiency there appears to be nothing to commend it, especially as it appears that the air needs of the Navy and Army have received little consideration. The naval and military chiefs have made emphatic protests.

New Construction.—The submarine depot ship built by Messrs. Vickers-Armstrong completed her trials early in the year, and was handed over to the Chilean Naval Mission in England. She is a vessel of 4,000 tons, and has geared turbines of 2,500 h.p., giving her a speed of 13 knots. She carries oil fuel and battery charging apparatus for submarines, and has repair workshops, torpedo stores, and accommodation for submarine officers and men.

COLOMBIA.

New Gunboats.—Three small gunboats are being built by Messrs. Yarrow and Co., at Scotstoun, for the Colombian Navy. They will be vessels of 140 feet, propelled by internal combustion engines designed to give a speed of 13½ knots. The British Admiralty have agreed to afford technical supervision.

THE ARGENTINE FLOTILLA LEADER MENDOZA.



THE ARGENTINE FLOTILLA LEADER LA RIOJA.

Two of the three built in England, 1928–29, *of* 1,520 *tons*, 45,000 *horse-power and* 36½ *knots.*

(By courtesy of the builders, J. Samuel White and Co., Ltd., East Cowes, Isle of Wight.)

ECUADOR.

As at present constituted the Ecuadorean Navy is essentially a hydrographic service, and has charge of lighthouses, buoys, etc. It also provides transport for troops and mans the coastal artillery.

It is administered by the Minister of War and Marine, who, at present, is a Colonel in the Army; he is assisted by a Director-General of the Navy; the former is at Quinto and the latter at Guayaquil; each has four naval advisers.

The personnel consists of 1 Captain, 3 Commanders, 8 Lieutenant-Commanders, 32 Lieutenants, and 10 Sub-Lieutenants. There are 5 Cadets undergoing training at the Chilean Naval School at Valparaiso.

The total number of ratings in all branches is only 290. Service is voluntary.

PERU.

The Peruvian Navy has for the past ten years been run chiefly by the United States Naval Mission, but it appears to be gradually assuming its own command and sense of responsibility, and in the near future the Mission may become merely an advisory body, or lapse altogether.

Meanwhile, both the Navy and Army have been relegated to a subordinate position by a decree of the Minister of Defence which announced that whereas "up to the present time the Navy has always been considered the first line of defence . . . now the aeroplane has acquired great importance and has become a powerful and efficient arm for all purposes of national defence. . . . In the particular case of Peru, the defence of her coasts and frontiers will depend almost entirely on aviation."

Except for a sum of £30,000 set aside for a new training ship, no new construction is projected, and all available funds are to be devoted to acquiring twenty-six aeroplanes, which are being purchased on easy terms from the United States.

The Navy and Air Estimates for 1930 amounted to £823,596 as compared with £675,717 in 1929. The increase is due to the development of the Aviation Corps, which is really a combined naval and military force under the Ministry of Marine and Aviation.

URUGUAY.

A hydrographic survey ship, the Capitan Miranda, has been launched at Cadiz. This is of interest as being the first warship built in Spain for any country in America.

ASIATIC.

CHINA.

The National Government have ambitious schemes for developing a modernised navy, and have been credited with projecting a programme which includes: two small battleships; two light cruisers;

two submarines; two minelayers, three destroyers, and various auxiliary craft.

It is very doubtful, however, whether any appreciable advance will be made under the present unsettled regime. Nevertheless a first step has been taken in the appointment of a Naval Mission, headed by Admiral Tu-Hsi-Kuei, a one-time Premier of the Northern Government and C.-in-C. of the Northern Navy. The mission has been sent out to study foreign navies. On arrival in this country early in the year, Admiral Tu had the honour of being received by H.M. The King; he also had interviews with the Prime Minister, the First Lord, and the First Sea Lord. He visited the naval dockyards, and establishments at Dartmouth and Greenwich, and the works of Messrs. Vickers-Armstrong at Barrow and Erith.

On December 2, 1930, it was announced that, in accordance with the Sino-British Naval Agreement, signed in June, 1929, at Nanking, a British Naval Mission under Captain H. T. Baillie-Grohman, D.S.O., O.B.E., is to proceed to China to advise and assist the Ministry of the Navy of the Nationalist Government in the projected programme of reorganisation and modernisation. Captain Baillie-Grohman will assume the rank of Commodore in the Chinese Navy.

In January last, eight Chinese Sub-Lieutenants joined the R.N. College, Greenwich, and twelve Cadets joined H.M.S. Erebus for training.

The gunboat Min Chuan has completed her trials, and the Kiangman Dock and Engineering Works at Shanghai are to build a larger gunboat, to be called the Yat Sen. The company is also converting a river steamer into a seaplane carrier, to be named the Teh Sing. This vessel will carry two machines.

E. ALTHAM.
Captain, C.B., R.N.

CHAPTER III.

Comparative Strength and Distribution.

During the past year, the influence of the Washington Treaty has again operated to prevent any change in the relative strength of the battle fleets of the leading naval Powers. Preliminary steps were taken towards making the reductions in the totals of capital ships agreed upon at the London Naval Conference. The first indication of change in this respect was the decision taken by the British Admiralty, in September, 1930, in advance of the ratification of the Treaty, to place the battleship Benbow on the sale list. The British battleship total, therefore, stands at 15, one less than last year. This is the only change in the lists of battleships and battle-cruisers.

It is the custom to regard battleship construction as suspended indefinitely by treaty, but this is not the case. While Great Britain, the United States, and Japan agreed not to lay down any of the 35,000-ton capital ships to which they were entitled during the years 1931–36 inclusive, this is but a postponement of replacements which will sooner or later become inevitable, if the present view of the functions and purpose of the battleship held in all the principal navies remains unchanged. Moreover, Italy and France reserved the right to lay down at any time the replacement tonnage to which they were entitled under the Washington Treaty. Under this, they were each permitted to lay down 35,000 tons of capital-ship tonnage in 1927, and another 35,000 tons of capital-ship tonnage each in 1929. Whether, or to what extent, they will act upon this reservation will probably depend very largely upon the policy of Germany, whose Ersatz-Preussen (laid down 1929, of 10,000 tons, 26 knots, large radius of action, and six 11-in. guns) is the only vessel at present building which comes within the classification of a battleship.

As regards the capital ships of the three principal Powers, these are to be scaled down between now and 1936 to a ratio of 5–5–3 in numbers of ships. Instead of 20 capital ships (including four battle-cruisers), Great Britain will have 15, giving up the four "Iron Dukes" and the Tiger. Instead of 18 battleships, the United States will have 15, by the surrender of the Florida, Utah and Wyoming. Instead of 10 capital ships (including four battle-cruisers), Japan will have nine, the Hiyei being scrapped. This aggregate of 39 remaining ships compares with a total of 115 possessed by the same three Powers in 1914; and whereas there were 26 other vessels under construction for them, to-day there are none. This, at least, affords an indication of the extent of reductions in naval armaments as compared with the pre-war condition of things.

ACTIVITY IN CRUISER BUILDING.

The Treaty of London fixes the relative strength of Great Britain, the United States and Japan in all the principal classes of ships. The cruiser tonnage it allows, the amount now effective, and the extent of actual building programmes in hand, are shown in the following table :—

CRUISER TONNAGE ALLOWED BY TREATY, ALREADY BUILT, AND UNDER CONSTRUCTION.

	Great Britain.	United States.	Japan.
Allowed.	339,000	323,500	208,850
Built and completing	340,411 (54)	150,500 (18)	166,815 (29)
Building	15,400 (2)	50,000 (5)	40,000 (4)
Authorised . . .	21,000 (3)	50,000 (5) *	? (3)

While there has been activity in the building of cruisers, it has not yet made any alteration in the relative positions of the countries concerned. But this state of things will not continue indefinitely if present policies are carried into execution. The cruiser construction actually in hand in France in the autumn of 1930 comprised four ships of 31,711 aggregate tons, one of which is the cruiser minelayer Pluton, of 5,215 tons. The construction actually in hand in Italy amounted to ten ships of 69,602 aggregate tons, or more than double that of France in numbers and nearly double in tonnage. The Italian tonnage now building, in fact, exceeds that of all her existing cruisers put together. France and Italy have respectively eleven and ten cruisers effective under twenty years of age, the French tonnage being 79,183 and the Italian 51,737. It will be seen that when the building tonnage is added to these totals, provided no scrapping of older ships takes place at the other end, Italy will overtake France for the position of second strongest Power in Europe in this type, for she will have at her disposal 20 ships of 121,339 tons, as against the French total of 15 ships of 110,894. In other types, also, it would seem that Italy is determined to implement her claim to parity with France.

BRITISH CRUISER STRENGTH.

The number of British cruisers on the effective list again stands at 54, as at the end of 1929. The three ships of the 1926 programme (Dorsetshire, Norfolk and York) have been passed into service ; but three old ships (Birmingham, Lowestoft and Dartmouth) have been put upon the sale list. The total of 54 is made up as follows :—

"C" class, completed 1915–1922, 3,895 4,290 tons, four or five 6-in. guns	24
"D" class, completed 1918–1922, 4,850 tons, six 6-in. guns . . .	8
"E" class, completed 1926, 7,550–7,580 tons, seven 6-in. guns . .	2
"Hawkins" class, completed 1918–1925, 9,700–9,996 tons, six or seven 7·5-in. guns	4
"County" class, completed 1928–30, 10,000 tons, eight 8-in. guns . .	13 †
"York" class, completed 1930, 8,400 tons, six 8-in. guns	1
Brisbane and Adelaide (Australian Navy), 1916–1922, 5,120 tons, eight or nine 6-in. guns	2
Total	54

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* One of these cruisers cannot be laid down before 1933 nor completed before 1936; another cannot be laid down before 1934 nor completed before 1937; and another cannot be laid down before 1935 nor completed before 1938.

† Includes 2 Australian Navy.

The most significant fact about the British cruiser position, regarded both absolutely and relatively to that of other countries, is the weakness of the " tail " of small, war-built " C " class vessels and the rapidity with which these will become obsolete in the years immediately ahead. Assuming an age limit of 16 years from date of completion, such as is embodied in the London Naval Treaty, six cruisers would pass off the effective list in 1931, six in 1932, six in 1933, seven in 1934, and six in 1935—a total of 31 vessels within five years. The amount of construction in hand, or at present contemplated, is altogether inadequate to redress the wastage which would result from a rigid application of this age limit. The position may be shown thus :—

CRUISER STRENGTH, AGE LIMIT 16 YEARS.

Year.	Due for Scrapping (Age Limit 16 Years).		Due for Completion.	Total left under 16 Years.
1931	Castor Carysfort Calliope	Cleopatra Comus Champion	Exeter, authorised 1927	49
1932	Constance Cambrian Concord	Canterbury Centaur Brisbane	(nil) 1928 programme cancelled	43
1933	Caradoc Caledon Curlew	Calypso Ceres Cardiff	Leander, authorised 1929 3 ships, authorised 1930	41
1934	Curacoa Carlisle Danae Dragon	Coventry Vindictive Dauntless	? 3 ships, to be authorised 1931	37
1935	Delhi Cairo Colombo	Dunedin Calcutta Hawkins	? 3 ships, to be authorised 1932	34
1936	Effingham * Frobisher *		? 4 ships, to be authorised 1933	36

It is obvious from the foregoing that a 16-year age limit, although it has in principle the sanction of the London Treaty, cannot be applied in the case of British cruisers without a serious diminution of strength below the number of 50 vessels agreed upon as the minimum. In 1935, no less than 18 of our cruisers will be over 16 years of age, nor can they be replaced for some time longer under the clause in the London Treaty which limits the total replacement tonnage of British cruisers to be completed prior to December 31, 1936, to 91,000 tons. No cruisers of 16 years or over are likely to figure in the lists of other Powers ; they may all be replaced, and by special provision Japan may replace the Tama (completed 1921) on attaining the age of 15 years.

* Under special provisions of the London Treaty.

An age limit of 18 years would permit of more than fifty cruisers being retained on the list in the years 1931 and 1932, but from 1933 onwards the total would decline to about 40 as follows —

CRUISER STRENGTH, AGE LIMIT 18 YEARS.

Year.	Due for Scrapping (Age Limit 18 Years).		Due for Completion.	Total left under 18 Years.
1931	Nil		Exeter, authorised 1927	55
1932	Nil		Nil (1928 programme cancelled)	55
1933	Cleopatra Comus Champion	Carysfort Calliope Castor	Leander, authorised 1929 3 ships, authorised 1930	53
1934	Constance Cambrian Concord	Canterbury Centaur Brisbane	? 3 ships, to be authorised 1931	50
1935	Caradoc Caledon Curlew	Calypso, Ceres, Cardiff	? 3 ships, to be authorised 1932	47
1936	Curacoa Carlisle Danae Dragon Frobisher *	Coventry Vindictive Dauntless Effingham *	? 4 ships, to be authorised 1933	42

It is clear from the foregoing that certain ships must be retained on the list beyond 18 years to maintain a quota of 50 ships in 1934 onwards. This is even allowing for a more rapid rate of building and completion for the cruisers authorised in 1930–1933. It is undoubtedly a great disadvantage to have large blocks of ships becoming obsolete at the same time. The disadvantage can only be mitigated if the falling out from obsolescence is averaged over a term of years and the replacement building adjusted accordingly. This is the declared policy of the Government, as it was stated by the Prime Minister in a discussion on the London Conference in the House of Commons on May 15, 1930. Unfortunately it is a policy which is very slow in being applied. If regular replacement programmes had been followed in each of the years from 1927 onwards, the worn-out and weak " C " class cruisers could have been scrapped when they reached an age of between 16 and 18 years, and still the total would have been maintained at 50 ships. As it is, some of them must be kept on until the full 20 years, and for most of them the age limit will be much nearer 20 years than 16. Lord Jellicoe, speaking on this point in the House of Lords on May 8, 1930, said :—

> " I cannot myself see how it is possible for us to attain a total of anything like fifty cruisers by December 31, 1936. Our cruisers go off at such a rate owing to the majority of them having been constructed during the War, and therefore their life being limited to sixteen years, that it is absolutely impossible, unless we had a building programme of five or six cruisers a year, to get our numbers to fifty by the end of 1936."

* Under special provisions of the London Treaty.

As compared with the British position in 1936, with its heavy proportion of old war-built cruisers over 16 years of age, the oldest cruisers in the United States Navy in that year will be the post-war "Omaha" class, completed in 1923–25, and therefore between 11 and 13 years of age; and in Japan the post-war "Kuma" type, completed in 1921, and therefore 15 years old.

Cruisers of Other Powers.

The United States total of cruisers completed remains the same as last year, viz. 19 ships, as five new vessels of the "Pensacola" class (Pensacola, Salt Lake City, Northampton, Chester, and Houston) have come into service, and five obsolete cruisers have been scrapped. The latter range from the Olympia, completed in 1894, one of the old second-class protected cruisers, to the last of the armoured cruisers of the "Tennessee" type, completed in 1908. In the effective total of 19 ships, 15 are of post-war construction, as compared with ten a year ago, and the only pre-war ships remaining for the present are the Pittsburg, Rochester, Denver, and Galveston.

No change whatever has occurred in the Japanese cruiser totals. There are 29 completed ships, and four building, the Takao, Atago, Chokai, and Maya, which during 1930 were brought to the launching stage. Of the 29, all but four have been completed since the war and are of 31 or 33 knots' speed.

The French cruiser total increased by one from 14 to 15 ships, as although the new 10,000-ton ships Colbert and Foch may now be reckoned effective, one old cruiser, the Edgar Quinet, was lost by stranding. This total does not include the old cruisers Gueydon and Condé (completed 1903–1904), which are still in existence, and the former of which is attached to the Instructional Squadron. Included in the 15 ships are eight of post-war construction, five of 10,000 tons and 8-in. guns and three of 7,000 tons and 6-in. guns. The Italian total remained unchanged at 12 ships, of which only two, the Trento and Trieste, are of post-war design, both 10,000-ton 8-in. gun ships. The completion of the Koln maintained the German total of cruisers at eight ships, four being old pre-war ships and four, the Emden, Konigsberg, Karlsruhe and Koln, new vessels built since the War.

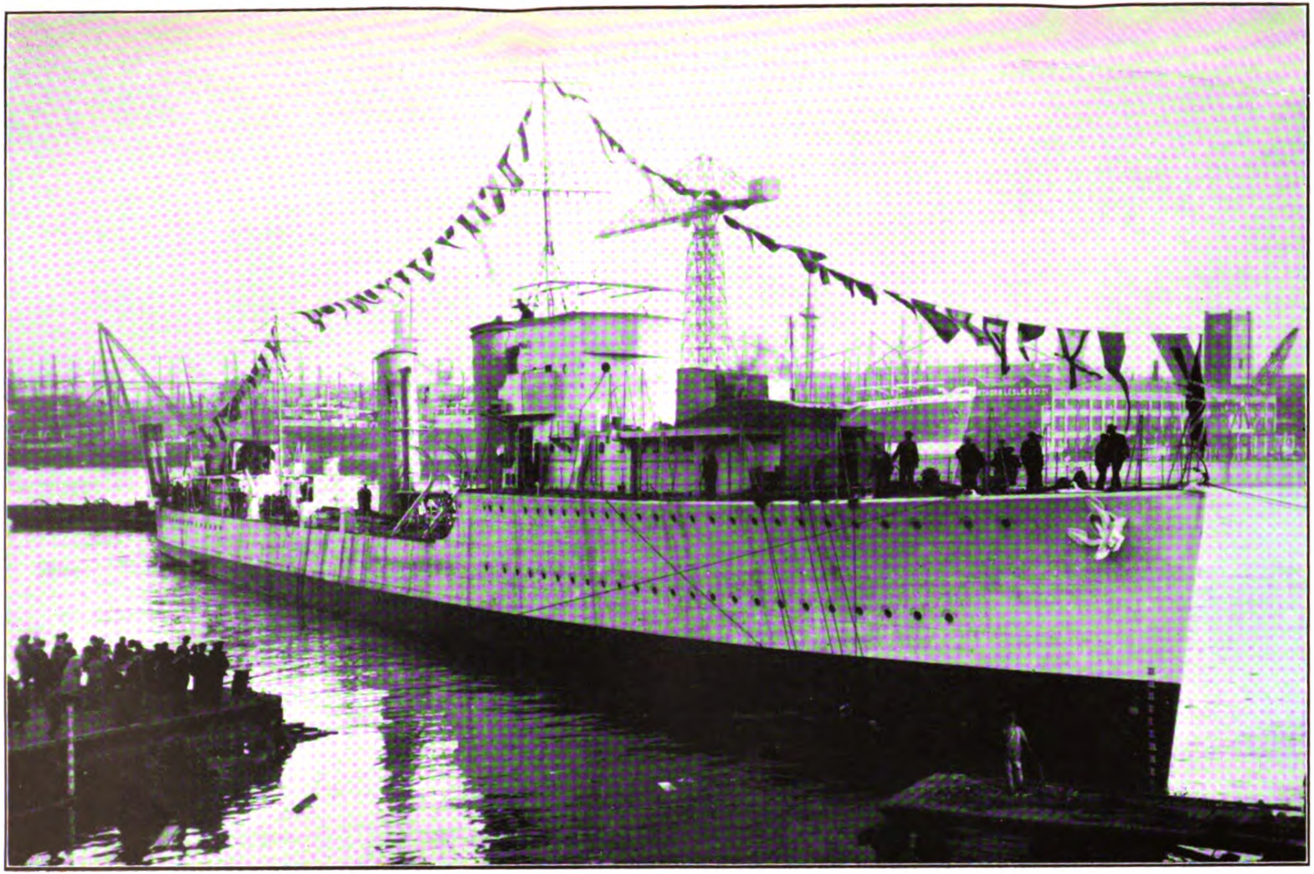
The principal change in the totals of destroyers is brought about by the scrapping of surplus U.S. vessels, which has brought down their total from 276 to about 214 units. The British total is much the same; but that of France shows an increase of 16 units to a total of 77, and that of Italy an increase of eight units to a total of 84. On the question of destroyer building, it is insufficient to take only the bare figures without regard to the ages and types of the vessels. Viewed from this standpoint, the British position is a very weak one. It was admitted in the Explanatory Statement accompanying the Supplementary Estimate issued on July 9, 1930, that "The position in regard to destroyer construction is that, from the years 1920 to 1929 inclusive, only 13 destroyers were completed." As Lord Jellicoe pointed out in the House of Lords, we have almost entirely neglected destroyer building since the War ceased. It is not so in other European countries. In the years 1920 to 1929 inclusive, France completed 29 destroyers and Italy 41. Both Powers, moreover, are producing flotilla leaders of large and powerful types which, if Great Britain followed suit, would be reckoned off her total cruiser allowance, whereas France and Italy are outside the scope of Part III of the London Treaty.

While the aggregate number of submarines in the navies of the principal Powers (about 347) remains at the same level as a year ago, it is significant that a reduction in the United States by the scrapping of old boats is more than offset by increases in the totals for Japan, France and Italy. There was, of course, ample scope for this levelling up, so far as numbers were concerned, as the United States figure of completed boats was double that of any other nation, but the high totals of submarines building in France and Italy (28 and 31 respectively) afford a curious commentary on the proposal made at the London Conference for the abolition of this class of vessel.

FLEET DISTRIBUTION.

Following the reconstitution during 1929 of the First Cruiser Squadron, Mediterranean Fleet, by the four new ships of the "London" class, the composition was changed during 1930 of the Second Cruiser Squadron, Atlantic Fleet, by the completion of the Norfolk, Dorsetshire and York. These vessels replaced the Comus, Frobisher and Canterbury respectively. The Hawkins, refitted after her return from China, became flagship of this Squadron in January instead of the Frobisher, so that this cruiser squadron belonging to what is probably regarded as the principal fighting fleet is not homogeneous, three of its ships being new 8-inch-gun 32¼-knot cruisers and the other a twelve-year-old 7·5-inch-gun cruiser of 30 knots. The cruisers set free in the Atlantic Fleet all joined the reserve at the home ports. The principal change on foreign stations was the remodelling of the Eighth Cruiser Squadron, America and West Indies, entirely with ships of the "D" class. The Dauntless, after a long refit, commissioned in March, 1930, to replace the Caradoc, which came home, recommissioned in July, and proceeded to China to replace the Castor. The Dragon, also after a long refit, commissioned to replace the Colombo, which was paid off for large repairs at Chatham. Later in the year the Durban was withdrawn from this Squadron for large repairs and was replaced by the Danae. Prospective changes in the cruiser squadrons include the relief by the Colombo of the Caledon, about July, 1931; and by the Ceres of the Calypso, early in 1932. The Caledon and Calypso are in the Third Cruiser Squadron, Mediterranean Fleet. On the Africa Station, the Calcutta, which is due to be taken in hand for large repairs at Chatham, is to be relieved as flagship in the spring of 1931 by the Cardiff.

The principal change in distribution apart from cruisers was occasioned by the completion of the first of the replacement flotillas of destroyers. The Codrington commissioned on June 11 to relieve the Keppel as leader, and seven of the "A" class destroyers (all



[*Photo by* **Frank and Sons**, *South Shields.*

H.M. DESTROYER BRILLIANT, 1,330 TONS.

Launched complete with engines, funnels and auxiliaries on board, October 9, 1930.

(By courtesy of the builders, Swan, Hunter and Wigham Richardson, Wallsend-on-Tyne.)

except the Acheron) commissioned at various dates between February 14 and April 23, to replace the Amazon and Ambuscade and five of the " W " class, in the Third Destroyer Flotilla in the Mediterranean. During 1931 the leader Keith and destroyers of the " B " class are to replace the Broke and vessels of the Fourth Destroyer Flotilla, Mediterranean Fleet. Delays occurred in the completion of new submarines of the Osiris and Parthian classes, and instead of six of each type, only four of the former had towards the end of 1930 been sent to China to replace the " L " class vessels withdrawn in 1928–29. The Medway, the new depôt-ship described in the Annual last year, accompanied these four new submarines to the Far East, and there replaced the Titania. The latter in turn relieved the Vulcan for duty with the Sixth Submarine Flotilla at Portland, and the Vulcan was allocated to form part of the establishment of the Defiance, torpedo school, at Devonport.

A redistribution of the sloops on foreign stations was approved on the completion in 1930 of the four new ships of this class authorised in the Estimates of 1928. The Hastings was ordered to relieve the Lupin in the Persian Gulf, and the Lupin replaced the Clematis in the Red Sea, the Clematis (completed 1915) being scrapped. The Penzance was ordered to relieve the Cyclamen in the Persian Gulf, and the Cyclamen was allotted to the Africa Station to replace the Wallflower, the latter ship (completed 1916) being scrapped. The Folkestone left England in July to relieve the Crocus in the Persian Gulf. The Crocus (completed 1916) was condemned as unseaworthy, and was paid off at Bombay on April 24, 1930, her crew returning home by freight. The Scarborough, after a term of duty with the First Minesweeping Flotilla, Portland, left in October to relieve the Wistaria on the America and West Indies Station, the latter ship being ordered home to be scrapped.

Foreign Fleets : Home and Atlantic.

The new 10,000-ton cruisers of the French Navy, the Duquesne (flagship of Rear-Admiral Descottes-Genon), Suffren, Tourville and Colbert, now form a fast squadron known as the First Light Division. In the autumn of 1930, this Squadron was ordered to embark the 120 midshipmen formerly in the wrecked cruiser Edgar Quinet for a training course in the Atlantic and to African ports. Its programme included calls at Cadiz, Madeira, Dakar, Rio de Janeiro, Bahia, La Guayra, and Havana. From January to August, 1931, this new squadron will exercise in the Mediterranean. In the Second Squadron of the Navy, based on Brest, the Bison serves as flagship of the Second Light Division, and on the completion of new leaders the two ex-German cruisers, Strasbourg and Metz, have been placed in reserve. The Fourth Light Division consists of the flotilla leaders Fougeaux, Leopard and Lynx. There is also the Second Destroyer Flotilla, composed of one leader and 12 destroyers ; and the Fourth Submarine Flotilla, including four submarines. Various small craft for training purposes are attached to the First Maritime Region, Cherbourg, and the Second Maritime Region, Brest. At the latter port is the Training Division, including the destroyer Glaive, the minesweepers Etourdi and Conquérante, and seven dispatch vessels of the "Meuse" type attached to the Permanent Minesweeping Commission.

The German naval forces in the North Sea and Baltic, include four battleships, but the Hessen has replaced the Braunschweig, which is paid off in company with the Elsass and Lothringen. The Schleswig-Holstein flies the flag of the Chief of the Fleet; and the Hannover that of the Commander-in-Chief of the Battleship Force; the other two ships being the Hessen and Schlesien. The new cruiser Konigsberg (completed 1929) flies the flag of the Commander-in-Chief, Scouting Forces. Her sister ship, the Karlsruhe, was detached during the greater part of 1930 on a cruise with cadets to African waters, in the course of which she visited Mombasa and Zanzibar in July. The Emden, the first of the German post-war cruisers, was due to leave in December, 1930, for a training cruise to the Mediterranean and East Indies.

Denmark's continued policy of naval reduction is reflected in the strength of her forces in commission. She has hitherto had four coast defence ships in service, but under the Estimates for 1930–31 only one such vessel, and a submarine division, are to be retained in permanent commission. During the summer months, Norway has in commission, in the Horten District, four coast defence ships, one of which, the Norge, is used as a training ship for cadets and recruits; four submarines; the Fröya and six other mining vessels, and various torpedo craft. Other small craft are stationed at Bergen and Christiansund.

Sweden maintains a Coastal Fleet (April to October) consisting of four coast defence ships, the Gustav V (flagship), Drottning Victoria, Oscar II, and Manligheten; a destroyer division of four vessels, and two vedette boat flotillas. The active submarine flotilla includes six vessels; the Svea serves as depôt ship and the torpedo boat Spica is attached. There is also a Transport Division, with the Freya as depôt ship; an Air Division, in which is the torpedo gunboat Jacob Bagge and the repair ship Blenda; and a School Division, of torpedo craft and the depôt ship Niord.

The seagoing Squadron of the Spanish Navy in Atlantic waters was further modernised during 1930. There are two battleships in commission, the Jaime I (flagship) and the Alfonso XIII. To the Cruiser Division there were added the Almirante Cervera and the Miguel de Cervantes, making with the Principe Alfonso, already completed, a trio of 7,850-ton medium cruisers with a 6-inch-gun armament. With three smaller 6-inch cruisers, Spain has a squadron of six post-war vessels of this class, which should be added to shortly by the completion of the Canarias, the first of her three 10,000-ton 8-inch cruisers. The Destroyer Flotilla was also strengthened during the year by the completion of the Jose Luis Diez and the Almirante Juan Fernandiz, making a total of three of these 1,650-ton, 36-knot flotilla leaders. Others of the class are to join the Flotilla on completion. In North African waters, Spain has the cruiser Extremadura, the gunboat Lauria, a guard boat, and some armed trawlers.

In the Portuguese Navy, the sloop Carvalho Araujo has been paid off, and the Republica is in reserve (these were formerly the British sloops Jonquil and Gladiolus). The ships in commission include the transport Gileano, five gunboats, five destroyers, four torpedo boats and three submarines.

Fleets in the Mediterranean.

The First Squadron of the French Navy still includes six battleships, none of which is in full commission. Three ships, the Provence, Paris, and Bretagne, are manned by four-fifths crews; and three others, the Jean Bart, Lorraine, and Courbet, are in reserve commission. The Provence flies the flag of the Commander-in-Chief and the Jean Bart that of the Rear-Admiral. A new division has been added to the First Light Squadron, known as the Seventh Light Division, composed of the new flotilla leaders Verdun (Senior Officer), Valmy, and Guepard. The destroyer forces, of which the Jaguar is the flagship of the Rear-Admiral commanding, include three flotillas. The First Flotilla has the Amiral Sénès (late German S. 113) and twelve destroyers; the Third, the Tempete and ten destroyers; and the Fourth, the Chastang and seven destroyers. The latest destroyers of "Le Fortune" type are to be found in the Third Flotilla. Also under the Admiral of the First Squadron is the Third Submarine Flotilla, of nine vessels.

What was formerly known as the Third Squadron is now an Instructional Division, attached to the First Squadron, and based on Toulon. The battleship Condorcet flies the flag of the Rear-Admiral; she is manned by a four-fifths crew and is used as a training ship for torpedo ratings and electricians. The cruisers Gueydon, Thionville, and Ernest Renan also form part of the Instructional Division. Other units belonging to it are the 13th (Fast Minesweeping) Flotilla of four destroyers in reserve commission, with the Intrepide as leader; and the Sound Signalling Group, which has been increased from three to six vessels. Two despatch vessels, the Baccarat and Montmirail, and the armed yacht Diana form the Levant Division.

The First Squadron of the Italian Navy, based on Spezia, with the Tyrrhenian Sea as its normal cruising ground, has for its principal units the First Division, consisting of the 10,000-ton cruisers Trieste and Trento, and which it is expected will be joined shortly by other new cruisers. The Second Division is composed of the cruiser Ancona as flagship, and two flotillas of destroyers, the First Flotilla including the Leone and eight vessels and the Second Flotilla the Pantera and eight vessels. Under the direct orders of the Ministry of Marine, there is now a Scouting Division, consisting of the flotilla leader De Recco as flagship (in place of the Venezia), and twelve flotilla leaders of the "Luca Tarigo" class.

In the Second Squadron, which is based on Taranto, and cruises in the Ionian Sea, the only battleships remaining in commission are two, the Andrea Doria (flagship of the Rear-Admiral) and Caio Duilio. In the Special Division, which has its cruising ground in the Adriatic, the Aquila has returned to duty as ship of the Captain (D) in place of the Falco. Italy's Colonial Forces include a Tripoli Squadron, composed of two small craft; the Cirenaica Squadron, also composed of two small craft (one as stationnaire ship at Benghazi); a Red Sea Division, including the Lepanto and Porto Corsini; and an Ægean Squadron, with the Tolosetto Farinati as senior officer's ship.

In the Greek Navy, the First Squadron now consists of the cruiser Averoff as flagship, and four destroyers, the Leon, Aetos, Sphendoni and Thyella. There is also a Training Squadron composed of torpedo craft. Five submarines, the sloop Nautilus (for hydrographic duties), and the repair ship Ephestios (late Chios) are also in commission.

The Soviet Naval Forces in the Black Sea during 1930 included three cruisers, the Profintern having joined temporarily from the Baltic. There are some torpedo and submarine craft, and 25 submarine chasers fitted for minelaying.

The Sea Flotilla of the Roumanian Navy includes the Italian-built flotilla leaders Regele Ferdinand I, Regina Maria, Marasti, and Marasesti; the ex-Austrian torpedo boats, Sborul, Naluca, and Zmeul; four gunboats fitted for minesweeping; and five motor launches. On the Danube are seven monitors, and various gunboats and armed yachts. A Roumanian flotilla is expected to visit Malta in the spring of 1931.

EASTERN WATERS.

The Royal Netherlands Navy Squadron in the East Indies includes the coast defence ship De Zeven Provincien, which serves as training ship at Macassar; the cruisers Java and Sumatra; five destroyers, the Panter, De Ruyter, Evertsen, Piet Hein and Kortenaer; twelve submarines, and various small craft. Certain of these vessels made a cruise to New Zealand ports during the autumn of 1930.

THE FAR EAST.

The cruiser Waldeck Rousseau serves as the flagship of the Far Eastern Division of the French Navy. The Division also includes five dispatch vessels, six gunboats in the Yangtze, and two gunboats in the West River. Italy maintains in the Far East the cruiser Libia and two gunboats.

The United States Asiatic Fleet still has the cruiser Pittsburg as flagship of the Commander-in-Chief, but in the spring of 1931 she is due to be relieved by the new cruiser Houston. There are four attached gunboats. The Yangtze Patrol includes eight gunboats, with the Luzon as flagship; and the armed yacht Isabel. The South China Patrol includes two gunboats, with the Mindanao as senior officer's ship. There is also the 15th Destroyer Squadron, made up of three divisions of six destroyers each, with the Paul Jones as flagship; and two submarine divisions, Nos. 16 and 17, each with six boats. Two of the destroyer divisions, No. 38 and No. 39, with the tender Black Hawk, made a cruise to Singapore and the Dutch East Indies in October and November, 1930.

JAPANESE FORCES.

There has been no change in the organisation of the Japanese forces in commission, but several minor alterations in the composition of squadrons. The First Fleet consists of the following : First Squadron, battleships Yamashiro, Mutsu (flagship), and Ise, and the battle-cruiser Haruna ; Third Squadron, cruisers Yura (flagship), Nagara and Sendai ; First Destroyer Squadron, cruiser Naka (flagship), and four flotillas of four vessels each ; First Submarine Squadron, cruiser Jingei (flagship) and two flotillas of three boats each.

In the Second Fleet, an interesting change has been the replacement of the battle-cruisers Haruna and Hiyei by the first four of the new 10,000-ton post-Washington cruisers. They form the Fourth Squadron—Ashigara (flagship), Haguro, Myoko and Nachi. The Fifth Squadron consists, as before, of the intermediate 7,100-ton cruisers which preceded the Nachi type, but the Aoba has relieved the Kako as flagship. The Second Destroyer Squadron includes the Kinu as flagship and three flotillas of four vessels each ; and in the Second Submarine Squadron there are the Chogei (flagship) and three flotillas of three boats each.

The First Aircraft Carrier Squadron includes the Hosho as flagship and the Kaga, with a division of four destroyers. Various other units are organised independently for attachment to the combined fleets as required, including the First Minesweeping Flotilla.

The cruiser Hirado has relieved the Tone as flagship in the Yangtze, where the gunboat and destroyer flotilla is maintained at its former strength. In the Second Foreign Service Squadron the Kiso has become flagship of the Ninth Flotilla of four destroyers.

THE UNITED STATES FLEET.

While the organisation of the United States Fleet remains substantially the same, several changes in composition have occurred as a result of the passing into service of the new 10,000-ton cruisers, and also of the withdrawal for scrapping of 58 destroyers and minelayers, the places of which have been taken by vessels laid up at Philadelphia and San Diego. The chief alterations are the relief of the older battleships Texas, as flagship of the United States Fleet, by the Chicago, and Wyoming, as flagship of the Scouting Fleet, by the Augusta ; and the formation of a new third cruiser division in the Atlantic. It is in contemplation to replace all the battleships in the Scouting Fleet by new 10,000-ton cruisers ; hitherto the name of this Fleet has been a misnomer, and battleships have been retained owing to the shortage of cruisers. The Northampton, after a shakedown cruise to the Mediterranean, was assigned as flagship of the Light Cruiser Divisions, Scouting Fleet, in place of the Detroit, and to be flagship of the new Division 5, into which were also drafted the

Chester and Louisville. The Salt Lake City was allotted to Division 2, and the Pensacola to Division 3, both temporarily; they will eventually join Division 5.

On the Pacific side, there are normally the Battle Fleet and the Base Force; and on the Atlantic side, the Scouting Fleet and the Control Force. The Battle Fleet includes Battleship Divisions 3, 4 and 5 under a Vice-Admiral; Destroyer Squadrons 6 and 10, under a Rear-Admiral; Aircraft Sqaudrons (in which are the principal carriers Lexington, Saratoga and Langley), under a Rear-Admiral; Submarine Divisions 11, 19 and 20, under a Captain; with further submarines based on Pearl Harbour. In the Base Force, under a Rear-Admiral, are the minelayers and auxiliaries.

The Scouting Fleet, under a Vice-Admiral, has hitherto included Battleship Division 2, but with the scrapping of the Wyoming (late flagship), Florida, and Utah this Division is represented temporarily by one ship, the Arkansas. Under a Rear-Admiral are the three Light Cruiser Divisions 2, 3 and 5. There are two Destroyer Squadrons, 7 and 14, under a Rear-Admiral; and Aircraft Squadrons under a Captain, with the tender Wright as parent ship. The Control Force, under a Rear-Admiral, includes a Mine Squadron, five divisions of submarines, and a division of "Eagle" boats.

Plans for the Fleet concentration in the vicinity of Panama between February 12 and March 24, 1931, indicate the employment of 11 battleships, 3 aircraft carriers, 13 light cruisers, 74 destroyers, 39 submarines, and 44 auxiliary ships. Based on board and operating from the ships of the Fleet will be 256 naval aircraft. This is the force which is expected to be under the command of Admiral J. V. Chase, Commander-in-Chief of the United States Fleet, when that officer, at the invitation of the U.S. Government, is visited by Admiral Sir Michael Hodges, Commander-in-Chief of the British Atlantic Fleet, in the Nelson, at Colon between February 23 and 28 1931.

G. H. HURFORD.

CHAPTER IV.

THE LONDON NAVAL TREATY.

The London Conference was opened on January 21, 1930, *in the Royal Gallery of the House of Lords, by His Majesty the King. Its task was to finish the work begun at Washington in* 1921. *On April* 22, 1930, *a Treaty was signed in London (International Treaty, Cmd.* 3556, *Misc. No.* 9, 1930) *by twenty-seven delegates of Great Britain and the Dominions, the United States, France, Italy, and Japan.*

THE new Treaty cannot be said to possess the merit of simplicity, for its terms involve what to the uninitiated must appear to be a maze of technical complexities, but its essence lies in an endeavour to secure, or at least assist, disarmament by eliminating the factor of competition in armaments from the sphere of international relations. In this field it has attained a large measure of success. The baleful influence exerted by such competition was the principal cause of ill-feeling between England and Germany in the early years of the century. This was, in fact, the main question at issue.* No doubt it may be argued that the armaments were in themselves merely the expression of a German policy, and that it was really the policy behind them that was at fault, but the fact remains that the real menace lay in the armaments and that it was their growth, measured in Dreadnought rivalry, that fostered ill-will and suspicion.

The seed of a similar rivalry was growing between England and the United States. It was in 1916 that President Wilson launched a big naval programme to support the claims of neutrals at sea against England's policy of blockade. It was the consummation of this programme that cast a dark shadow across the Versailles Conference in 1919, and led Lord Robert Cecil on April 18, 1919, to write to Colonel House urging its abandonment in the cause of peace.†

It is impossible in the face of this experience to deny that competitive building is a serious bar to the maintenance of good relations between nations, nor can it be denied that independent building may very easily assume an aspect of competition. It was so in the case of Germany and England from 1900 to 1914 ; it was so in the case of the United States in 1919 ; it was so in 1926 when the United States woke up to the fact that they had only two 10,000-ton 8-inch-gun cruisers against the British eleven, and announced the discovery in an explosion of feeling which was only too readily exploited by "propagandists of hate."

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* Gooch and Temperley, " British Documents as to the Origins of the War," 1898–1914, 1928.

† "America's Naval Challenge," Frederic Moore, 1920, p 30.

Armaments undoubtedly constitute a secondary source of antagonism which aggravates and inflames any primary question at issue between two powers. There can be little doubt that if Germany had consented to the limitation or equilibrium of naval power that was under discussion twenty years ago, the possibility of war would have been greatly diminished.

And there is another aspect to standards of armed force. The question of forces, naval, military or air, cannot be considered, so to speak, in a technical vacuum. It is closely and inextricably associated with the trend of one's relations with particular powers. If these relations are good, the necessity of armaments is not so pressing. And there is also an economic aspect—not unimportant. A power that is mistress of the world's wealth can be mistress of the seas. That was our position in the eighteenth and nineteenth centuries, but it is a position that has been considerably and detrimentally affected by the late War. The ardent believers in the Kellogg Pact may be fools, but they are at least fools of the order of St. Paul, and are not more foolish on the whole than the fanatics of the mailed fist; it can at least be said of the former that if they could convert the latter, the world would not be much the worse, whereas if the latter creed wins the day, the present form of civilisation must face a welter of unprecedented slaughter. The struggle is between peace on a basis of real goodwill, and peace maintained solely by the menace of war which is only a latent phase of war. And so we come to the beginnings of the Conference.

VIEWS—BRITISH AND FRENCH.

The principal Powers were already pledged by the Washington Conference to a specific relative strength in battleships, viz. Great Britain 5, United States 5, Japan 3, France 1½, Italy 1½. It is an open secret that France has chafed grievously under what M. Tardieu has called "the unjust tyranny of mathematical formulæ." * Nor does she favour conferences. Her views were clearly expressed in the Memorandum † delivered in London, in response to the British invitation. In that Memorandum the French Government expressed the view that a general technical agreement on armaments must be based on a previous political agreement. In other words, there must be a definite guarantee of armed assistance to any power in distress. Peace must be assured by a collective and effective guarantee and must be built on a cast-iron and concrete foundation of military "security." The real peace is, in fact, not the Peace of God but the Peace of Versailles. Moreover, it is on Article VIII ‡ of the Covenant of the League and not on any conference that the French desire to base any reduction of armaments. Mere ratios do not satisfy

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* M. Tardieu, at Calais, February 1, 1930; *The Times*, February 2.

† *The Times*, December 27, 1929.

‡ "Consistent with national safety and the *enforcement by common action of international obligations*."

realists and "do not permit of a rational application, appropriate for every state, of the principles laid down in Article VIII." *

It says a great deal for the common sense of everybody concerned that in spite of the devastating terms of this Memorandum, the Conference came to a successful conclusion.

The British Government, on the other hand, merely expressed the desire "to keep the highway of the seas open for trade or communication in relation to the political state of the world." It stated that it had to take into account its obligations under the Covenant and put its faith in agreements and conferences; if naval establishments were not to be a menace, an equilibrium must be maintained by means of international agreements, and would be secured only by the adoption of agreed programmes which must be the subject of conferences such as the present.† Briefly, Great Britain believed in periodical conferences to formulate concrete programmes.

CAPITAL SHIPS.

With regard to capital ships, the British Government suggested that their replacement under the Washington Treaty should be deferred for consideration of a further conference in 1935; that their limit of size should be reduced from 35,000 tons to 25,000 tons, and of gun calibre from 16-inch to 12-inch; and that their "age" should be lengthened from 20 to 26 years. It even went so far as to express the view "that it would wish to see an agreement by which the battleship would disappear altogether." Though the Treaty did not get so far, it brought no inconsiderable gain in the sphere of economy. All the Powers agreed not to lay down, during the years 1931 to 1936 inclusive, any of the replacement tonnage allowed for these years in the Treaty of Washington.‡ In other words they agreed to a battleship "holiday" of six years. Further, Great Britain, United States, and Japan agreed to accelerate the reduction of their battlefleets to the Washington level. Great Britain agreed to dispose of 5 ships within 30 months; United States of 3, and Japan of 1.§ This process will reduce the capital ships of Great Britain, United States and Japan to 15, 15, and 9,|| and means that the following number of ships due to be laid down between 1931 to 1936 will not be laid down—Great Britain 10, United States 10, France 3, Italy 3. But under the Washington Treaty, France and Italy were each entitled to lay down a ship of 35,000 tons in the two years 1927 and 1929. Neither Power exercised it, and both retain the right to do so.¶ And as France has also the right to replace the battleship

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* French Memorandum, December, 1929.

† Memorandum setting forth the Policy, etc., February 4, 1930 (Cmd. 3485).

‡ Washington Treaty, Cmd. 2036 of 1924, Cap. II, Part 3. This allowed for the laying down of, by the U.S. 10 ships; by Great Britain 10; by France 3; by Italy 3.

§ Great Britain: Benbow, Marlborough, Empress of India, and Tiger; also Iron Duke to become a training ship. United States: Florida, Utah and Wyoming as a training ship; Japan: Hiyei as a training ship.

|| For names, see "Fleets," Cmd. 3436, January, 1930, or "Brassey's Naval Annual."

¶ London Treaty, Cmd. 3556, 1930, Art. 1, p. 6.

France lost by accident in 1922, there stands in terms of tonnage to the " credit " of France and Italy—

France—3 battleships of 35,000 tons, 105,000 tons.
Italy—2 battleships of 35,000 tons, 70,000 tons.

France and Italy have also retained the right to rearm their old ships, and as under the Washington Treaty France expressly reserved the right to employ her allotment of capital ship tonnage as she might think advisable, she might possibly "invest" her credit of 105,000 tons in building 4 ships of 25,000 tons each. But though France is very reluctant to be bound by ratios, the fact remains that neither she nor Italy has laid down any new battleships, and it may be doubted whether they will do so. This portion of the Treaty has effected a very definite economy to Great Britain, the United States, and Japan. The saving to Great Britain has been estimated at 50 millions and to Japan 66 millions.* The strength in capital ships will be by 1932—Great Britain 15, United States 15, Japan 9.

CRUISERS.

It was cruisers that the Washington Conference unfortunately omitted, and it is cruisers which now form the substance and essence of the London Treaty enveloped in a variety of clauses not too easy to unravel. Indeed, if " Brassey's Annual " once fulfilled an indispensable function in reminding England of the necessity of a fleet, it can now perform a function equally indispensable of reminding her what fleet she is allowed to build. First of all, in the Treaty all cruisers have been divided into two sub-categories—

A—armed with guns over 6·1 inch.†
B—armed with guns under 6·1 inch.†

The age limit is to be 20 years from the date of completion if laid down after December 31, 1919; 16 years if laid down before January 1, 1920. The following is the completed tonnage which is " not to be exceeded on December 31, 1936." ‡

CRUISERS—TONNAGE ALLOWED. §

	United States.	Gt. Britain.	Japan.
Cruisers A, over 6·1-inch . .	180,000	146,800	108,400
	(182·880 tons metric)	(149·149)	(110·134)
Cruisers B, 6·1-inch and under	143,500	192,200	100,450
	(145,796)	(192,275)	(102·057)
Total	323,500	339,000	208,850

The total tonnage of cruisers allowed to Great Britain is 339,000 tons. Our present number and tonnage of Class A cruisers built and building is 19 of 186,226 tons, viz :—

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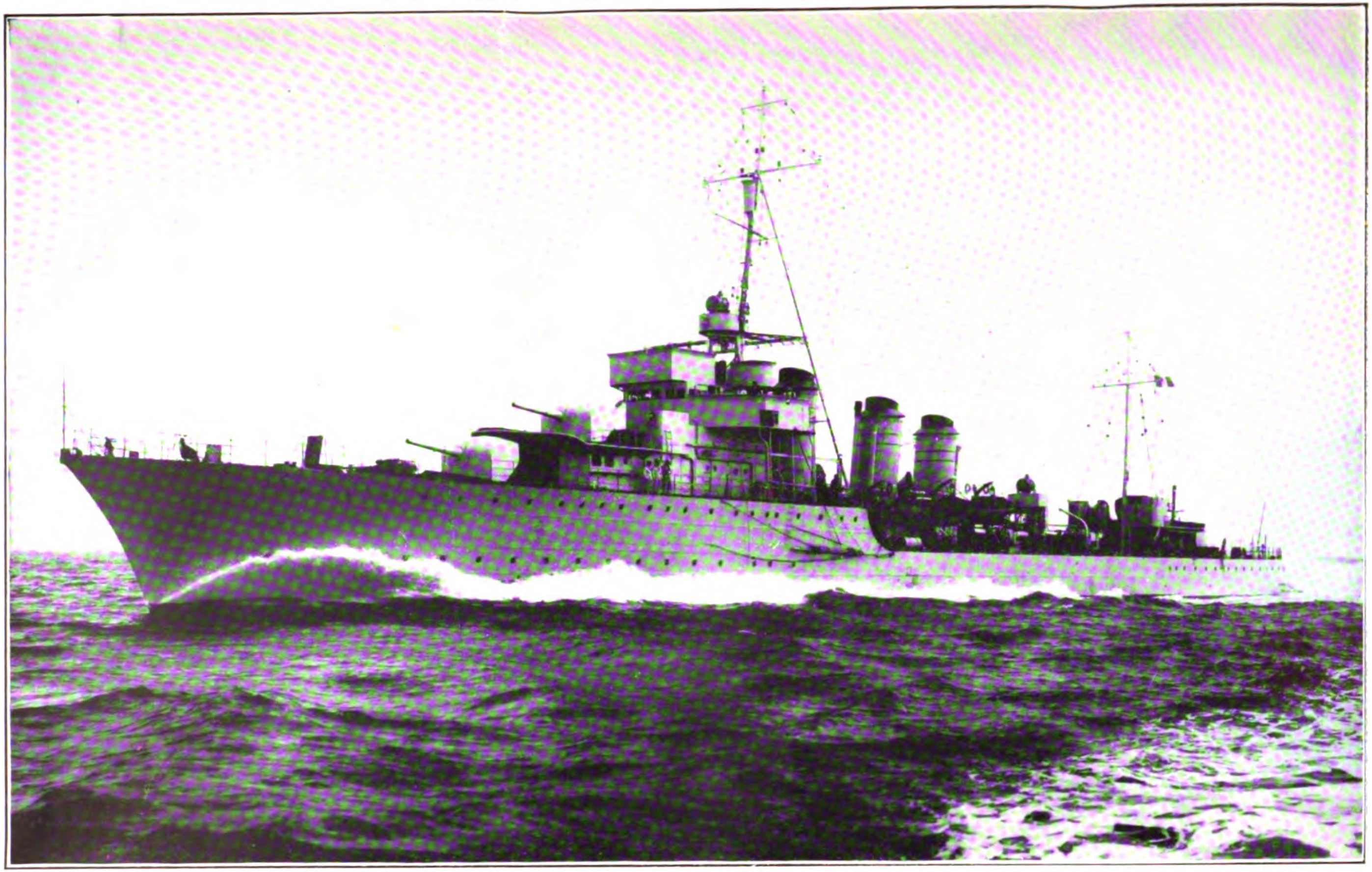
* *The Times*, April 4 and 12, 1930.

† L.T. Art. 15. In the Washington Treaty the dividing line proposed was 6-inch. The change has been made to include the French 15·5 cm. gun.

‡ Art. 16.

§ *Ibid.*



[*Photo by courtesy of the French Ministry of Marine.*

THE FRENCH DESTROYER FOUGUEUX, 1,378 TONS.

One of a class of 14 vessels of 35,000 horse-power, 34 knots, and armed with four 5·1-in. guns.

		Tons.
London, Devonshire, Shropshire, Sussex, Berwick, Cornwall, Kent, Suffolk, Cumberland, Australia, Canberra	11	110,000
Effingham (age limit, 1946), Frobisher (1944), Hawkins (1935), Vindictive (1934)	4	39,426
Building—Norfolk, Dorsetshire	2	20,000
Exeter, York	2	16,800
Total	19	186,226

A total of 186,226 tons, which must be reduced by December 31, 1936, to the quota of 146,800. This will be effected by the disposal of the 7·6-inch-gun ships—the Hawkins (over age 1935), the Vindictive (1934), and the further disposal, provided for in a special clause,* of the Effingham and Frobisher.

The strength in "over 6·1-inch" ships will then be 15 of 146,800 tons and will stand at this level for some years till the Suffolk reaches her age limit in 1942. So far the "running" is fairly easy. We have built 146,800 tons of 8-inch gun ships and can, under the Treaty, build no more, except to replace any lost by accident.

SMALLER CRUISERS.

Let us now consider Sub-Category B, of which the British quota is 192,200 tons. In this class at present we have 34 cruisers of 151,435 tons, of which 28 (118,485 tons) will reach the age limit before 1937, namely : †

Completion.	Age limit.	Class.	Number.	Tonnage.
1915	1931	(Castor)	6	23,445
1916	1932	(Constance)	6	25,120
1917	1933	(Caradoc)	6	25,410
1918	1934	(Curacoa)	6	27,330
1919	1935	(Dunedin)	5	22,300
		Over age in 1936 .	29	123,605
1920	1936	nil		
1921	1941	(Durban)	1	4,850
1922	1942	Despatch Diomede Capetown Adelaide	4	19,000
1926	1946	Emerald Enterprise	2	14,200
		Under age in 1936 .	7	38,050

Now under the Treaty, apart from cruisers under construction on April 1, 1930, we are allowed only 91,000 tons ‡ of new construction in Sub-Category B. Therefore to make up the quota of 192,200 tons we shall have :—

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* L.T. Art 20. The clause might almost be regarded as optional. It says that the Frobisher and Effingham "may be disposed of."

† "Brassey's Naval Annual," 1930 ; Fleets Return, Cmd. 3464, 1930.

‡ L.T. Art. 20 (a). The figure was stated to be a kind of compromise between age limits of 16 and 20 years.—Lord Thomson, House of Lords, July 2, 1930.

	Tons.
(*a*) New construction	91,000
(*b*) Cruisers under age	38,050
Total	129,050

leaving a balance of 63,150 tons to be filled up by some 15 older cruisers * which will be from one to three years over the age limit.

Considering the matter now in terms of units, there will be :—

New construction ("Leanders" of 6,500 tons) †	14
Cruisers under age	7
Cruisers over age	14

And adding large cruisers, 8-inch gun, 15, we get a total of 50 of which some 14 of the smaller will be a couple of years over the age limit, and 11 are contingent on the future programmes of 1931, 1932, 1933, 1934, 3 being already provided for in the programme of 1930–31.‡

It will be seen that the position is not so very terrible. Certainly, round the figure 50 a cloud of controversy has gathered. Certainly, too, in August, 1914, we had of large cruisers over 10,000 tons, 41, 486,700 tons; and of small cruisers under 10,000 tons, 72, 309,940 tons, or 113 cruisers of 796,640 tons. Certainly, too, at Geneva in 1928 Earl Jellicoe put forward the number of 70 as our requirements. And therefore critics of the Treaty ask why the figure of 70 has been reduced to 50. The answer is that the number "50" is hedged about with very definite conditions. The First Lord has stated them.

> "Under existing international conditions and for the strictly limited period covered by the Treaty, provided too that in this number there is a proper proportion of new construction and that the Powers reduce correspondingly their projected programmes." §

Lord Jellicoe and Lord Beatty both made powerful speeches on the whole subject in the House of Lords on July 2, 1930, and their unique experience—both have been Commanders-in-Chief of the Grand Fleet in the War and both have been First Sea Lords and Chiefs of the Naval Staff—commands the most respectful attention.

Lord Jellicoe plainly hinted that the figure "50" was governed largely by the consideration that the Government, in view of the small number built since 1927, thought it almost beyond hope to obtain more. He assumed that the Government intended to build fourteen 6-inch-gun cruisers of 6,500 tons displacement by 1936, but in the past it had been the Admiralty view that a cruiser for

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* Presumably the cruisers of 1919, 1918, and four of 1917, but this will probably depend on the merits of particular ships.

† Earl Beatty, House of Lords, July 1, 1930 : "that is to say 14 ships of 6,500 tons apiece."

‡ First Lord's Statement, July 2, 1930, Cmd. 3620, 1930.

§ First Lord's Statement, July 2, 1930. Cmd. 3620, also Prime Minister, May 15, 1930, quoted by Earl Jellicoe, House of Lords, July 2, 1930.

" extended sea operations " should not be much less than 7,000 tons.

On the other hand it may be pointed out that the figure " 70 " has never actually appeared in any First Lord's Statement, and from 1925 to 1928 we never had more than 56 cruisers actually built and available. According to the Admiralty statement 50 cruisers will permit of a disposition of 22 cruisers for service abroad (including 4 Australian and 2 New Zealand) and so far as building is concerned "it will be necessary to spread 27 cruisers over the 1930 to 1936 programmes, that is between 3 or 4 cruisers a year." But heavy cuts were made in the programme of 1928 (viz. 2 8-inch cruisers, 2 submarines, and 1 submarine depôt ship) and in that of 1929 (1 8-inch and 1 6-inch cruiser, 4 destroyers, 3 submarines and 2 sloops) and if the figure " 50 " now stands solidly entrenched in a Parliamentary paper and definitely accepted as meeting the requirements of the present, it must be steadily borne in mind and be given actual shape in successive programmes.

Meanwhile the building programme of 1930–31 has been fixed at 3 6-inch cruisers, 1 flotilla of destroyers, 3 submarines, 4 sloops, and 1 netlayer.

U.S.—CRUISERS.

The vexed question of United States cruisers has at last been settled. The Treaty allows her—

	Tons.	
Sub-category A (over 6·1-inch)	180,000	
Sub-category B (under 6·1-inch)	143,500	
Total	323,500	
Of Class A she has—		
Built and completing		8
Building (Indianopolis)		5
Ordered (C.L. 37, C.L. 38)		2

On the question of the number of 8-inch-gun cruisers, very considerable opposition had to be overcome. A lengthy inquiry was held on it by the Foreign Relations Committee of the Senate, and Admiral Mark Bristol, on May 16, expounded the views of the members of the General Board of the U.S. Navy who wished to have 8-inch gun cruisers and no others. Admiral Hilary Jones had once stoutly upheld the merits of the 6-inch gun in its greater rapidity of fire and more expeditious handling, but these views he explained were intended rather for the edification of the British than for the guidance of the American Navy. He was one of the delegates, and, returning home to be examined, on May 15 spoke very decidedly against the Treaty and in favour of the 8-inch gun.[*] The 6-inch-gun type, however, found a supporter in Admiral Pratt, who preferred an equal number of the two types, though Admiral Hilary Jones said he did not understand Admiral Pratt's position, and seems to have felt like the second lion in the virgin forest.[†] In any case the United States have greatly reduced their demands, for on

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[*] *The Times*, May 20, 1930.

[†] "As when two lions in a forest roar, the second lion thinks the first a bore."

September 11, 1929, the General Board were asking for 315,000 tons, viz.:

	Tons.
21 8-inch-gun type	210,000
10 " Omahas," 7,050 tons	70,500
5 6-inch type	35,000
	315,500

The figure of 21 has been reduced to 18, and three of these have become " optional." But here again one treads the mazy path of contingency. If the United States elects to construct the " optional " vessels they shall not be completed * before the following years:

	Lay-down.	Completion.
No. 16 (C.L. 39)	1933	1936
No. 17 (C.L. 40)	1934	1937
No. 18 (C.L. 41)	1935	1938

Thus she is not to have more than 15 8-inch-gun cruisers on December 31, 1936. On the other hand she is at liberty to substitute for each of the three " optional " cruisers 15,166 tons of 6·1-inch type or 45,948 tons in all, which would give her a small cruiser tonnage (6·1-inch) of 188,998 tons, equivalent to about six more cruisers in Sub-Category B. America has no large reserve of modern or fairly modern light cruisers such as we accumulated during the war, and since, beyond the 10 " Omaha " class completed in 1923, she has only three old cruisers † dating back to 1905, it is quite possible she may prefer to invest her tonnage in smaller cruisers. Of Class B she has only 10 " Omahas " of 75,000 tons, leaving her in this case some 19 to build. If she adopts this course the comparative strength in tons and (units) would be

	Great Britain.	America.
Class A	146,800 (15)	150,000 (15)
Class B	192,200 (35)	188,998 (29)

Here, however, one is confronted with another of the uncertainties of the Treaty. In the case of smaller cruisers it is not possible to fix the future tonnage with absolute certainty, for by Article 17 a transfer of tonnage not exceeding 10 per cent. of the total is permitted between Sub-Category B and destroyers. This amount, however, would mean at most no more than 15,000 tons (about 2 to 3 cruisers) for either Power.

JAPAN—CRUISERS.

Japan is allowed under Article 16

	Tons.
Class A	108,400 (12)
Class B	100,450

She has—

	Built.	Building.
Class A	8 of 68,400	4 of 40,000
Class B	17 of 81,455	Nil

It is common knowledge that this question was one of the thorniest points of the Conference. Japan wished to have the same number

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* L.N.T., Art. 18, p. 29.

† Cleveland (1903), Denver (1904), Galveston (1905).

as the United States, and it was to meet her views that the latter cut her quota down to 15 up to the year 1936. Even then a great current of feeling ran strongly in Japan. Admiral Kanji Koto asked to resign and felt compelled to take the exceptional step of forwarding a memorial on the subject to the Emperor.* The question was evidently one which aroused serious misgivings and called for the gravest consideration; and the final ratification of the Treaty by Japan is a token of her sincere desire to help the cause of peace. She has completed her quota of Class A and is left with a balance of 18,995 tons to invest in Class B, which will give her some two or three more cruisers of that type, making a total of about 19.† In terms of units this will give in 1936:

	Gt. Britain.	U.S.	Japan.
Class A, 8-inch guns	15	15	12
Class B, 6·1-inch guns	35	29	19

It is true that on the British side the figure "50" might be a source of anxiety to any Chief of the Naval Staff devising a scheme of general convoy on the eve of war, but on the assumption that we are not on the eve of war, nor likely to be, it does not deserve the jeremiads that have been hurled at it.

The fact is the principal weak point of the Treaty is not inside it but outside it. It does not lie in the limitation of cruisers by Great Britain, the United States, and Japan, but in the fact that France and Italy stand outside it. They also stand right on the flank of very important lines of communication in the Atlantic and Mediterranean, and their strength more particularly in cruisers and submarines is bound to influence strategical thought in other countries. Their policy is their own and it is not our business to comment on it. But though they have refused to tie themselves down to any figures of delimitation, France has put forward certain figures which may be regarded as representing her needs. They are not so very dreadful. She suggested:—

	Tons.
Large cruisers (10)	124,850
Small cruisers and destroyers ‡	258,297

This compares with the British

	Tons.
Large cruisers (15)	146,800
Small cruisers and destroyers	342,200

in the proportion roughly of 6 to 7 and 12 to 17.

France's present building policy is enshrined in the *Statut Naval* of December 24, 1924, which aims at providing a "light surface" fleet of 390,000 tons of cruisers and destroyers by 1943. In January, 1930,§ she had

	Built.	Building.
Large cruisers	3	3
Small cruisers	3	1

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* *The Times*, April 6, 8, 1930.

† She has also four older cruisers ("Chikuma" class) of 1912, mounting 8 6-inch.

‡ *The Times*, February 15, 1930. In the French system of classification cruisers under 6·1-inch and destroyers are grouped together.

§ "Fleets," Cmd. 3464, p. 17; also 10 old cruisers—7·6-inch type, 6, and 6-inch type, 4.

a total of 6 large and 4 small cruisers. In 1936 these numbers will probably have become 7 large and 7 small,* which does not seem an extravagant number in view of France's growing dependence on seaborne trade in grain and oil.

Italy put forward no figures. She asked for parity † with France—in principle. She possesses ‡ :—

	Built.	Building.
Large cruisers	2 (20,000 tons)	4 (40,000 tons)
Small cruisers	—	6 (29,376 tons)

a total of 12, which does not seem an extravagant number.

Destroyers.

The destroyer quota agreed upon and not to be exceeded on December 31, 1936, is :

Great Britain	150,000 tons
United States	150,000 „
Japan	105,000 „

The "life" of a destroyer is settled at 16 years § from the date of completion. Of this quota not more than 16 per cent. (i.e. 25,000 for Great Britain) is to be utilised in vessels over 1,500 tons (i.e. Flotilla leaders).‖

The clause is complicated by one of those baffling little intricacies that dog the interpretation of the Treaty, for Art. 16 (4) goes on to say that large "destroyers completed or under construction on April 1, 1930, in excess of the 16 per cent. may be retained, but no more exceeding 1,500 tons can be built until the reduction to 16 per cent. is effected."

This clause tells somewhat hardly on Great Britain and the United States, as most of their destroyers were built in big blocks in 1917, 1918, and 1919. For instance, 62 British were completed in 1918, all of which have reached the age limit of 12 years in 1930. At present the British Commonwealth has ¶ :

Flotilla leaders	16 . .	23,010 tons
Destroyers	134 . .	134,337 „
	150	157,347 „

of which only 4 destroyers of 5,485 tons will be under age in 1936, leaving 146 destroyers over age in 1936, of 151,862 tons. But building ** there are 39 of 52,496 tons, which will take the place of destroyers over age, to the extent of about 49 old destroyers of 52,496 tons, thus giving us in 1936: 4 + 146 + 39 — 49 = 140 of 157,178 tons. Of this tonnage 7,178 tons must be disposed of * which would leave us in 1936 with some 132 destroyers of 150,000 tons, of which 89 would be over age. But if the programmes of 1931, 1932, 1933, 1934 each consist of 9, as in the 1930–31 programme, they will provide 36 new destroyers to take the place of an approximately equal number out of the above 89 over age, leaving us in 1936 with approximately † 140 destroyers, of which 53, or about 37 per cent., will be over age.

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* See *Engineering*, Treaty of Naval Limitation, May 2, 1930.

† On March 20 the Italian Government reaffirmed its insistence on parity. *The Times*, March 21, 1930.

‡ "Fleets," p. 20.

§ If laid down before January, 1921, 12 years ; if after December 31, 1920, 16 years Annex 1. *Note.*—The tonnage of a destroyer may be taken as roughly 1,300 tons.

‖ Art. 16. The latest British flotilla leader, the Keith, is 1,330 tons.

¶ "Fleets, Return of," Cmd. 3464, p. 30.

** Years 1927, 1928, 1929, and including this year's programme, 1930–31 In the 39 there are 5 leaders of 6,960 tons.

United States.

The United States is faced with the same problem as Great Britain. Her huge War programme has left her with an heritage of the largest destroyer force in the world, which can only be adjusted to the 150,000 tons allowed in the Treaty by a process of wholesale discardment. Her destroyer strength is 296 ‡ of 296,825 tons, viz:

		Tons.
	225	224,395
For disposal	61	63,991
Coastguard	10	8,439
	296	296,825

Out of these 296, 74 vessels (70,617 tons) reach the age limit in 1930, and only 3 will be under age in 1936. This tonnage has to be reduced to 150,000 tons by the discardment of 146,825 tons. Of this the Disposal List and Coastguard List already represent 72,430 tons, leaving another 74,395 tons to be disposed of, which will probably mean scrapping all the destroyers completed previous to 1919 (i.e. 74 of 70,617 tons).

There are also 12 building, for which another 12 over age will go, which will leave her in 1936 with some 148 destroyers, of which 133 or about 88 per cent. will be over age.

Japan.

Japan has agreed to a destroyer quota of 105,500 tons. Her present strength is:

		Tons.
Flotilla leaders	23	39,100
Small destroyers	95	91,695
	118	130,795

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* This might consist of 8 of the "S" class.

† The above is only an estimate based on the lists in "Brassey" and the "Parliamentary Return of Fleets." The precise figure will depend on the adjustment of excess tonnage and of the tonnage of future destroyers to the total tonnage allowed in the Treaty.

‡ "Fleets, Parliamentary Return." Mr. Maurice Prendergast in an illuminative article in *The Navy*, September, 1930, gives 284 destroyers of 290,304 tons, as the figures supplied by the U.S. Naval Attaché. For the sake of uniformity in reference, the above figures are those of the Parliamentary Return. The difference is probably due to the interim disposal of some 12 vessels.

Her present percentage of leaders is about 30 per cent., nearly double that allowed by the Treaty, but Art. 16 (4) has been framed to meet this and allows the retention in excess of the 16 per cent. of large destroyers completed and under construction on April 1, 1930.

Japan has thus to get rid of 25,295 tons, which will disappear probably in the form of some 35 of the "Yugao" class, leaving her with some 23 large and 45 small or a total of 68 destroyers with a proportion of about 37 per cent. of the larger type.

France.

Though France did not agree to any limitation in cruisers and destroyers, the figures she put forward were, for small cruisers and destroyers, 258,297 tons.*

She has:

		Cruisers. Tons.		Destroyers. Tons.
Built	(8)	47,375	(56)	37,649
Building	(1)	6,496	(6)	8,260
Total		53,871		45,909

A total, built and building, of 99,780 tons to which the 6 old "Edgar Quinet" class (67,044 tons) may be added making a total of 166,824 tons built and building. This leaves her with a margin of some 91,473 tons.

It is not unreasonable to assume that she will replace the "Edgar Quinet" class by 6 or 7 modern small cruisers and build some 44 more destroyers, bringing the latter total up to 100, which will still leave a balance of some 59,000 tons to make up the 258,297 tons. Whether it will be actually filled up or whether it will take the form of cruisers or destroyers, it is quite impossible to say.

Submarines.

The abolition of submarines was discussed at the Fourth Plenary Session which opened on February 11, 1930. Great Britain and the United States were both in favour of its abolition on the grounds that it is principally a weapon of offence. The argument was not a conclusive one, for the terms "offensive" and "defensive" seem to belong rather to the incidental use of a weapon than to the weapon itself; the mine, for instance, is a defensive weapon, but it may be very offensive to a neutral ship. Italy, though she took the view that the submarine had a defensive use, was ready to agree to its abolition. France and Japan, however, were opposed to its abolition, and the suggestion was shelved, which is to be regretted, for the absolute abolition of an instrument notorious for its inhuman use and not specially potent in defence would mark a real step on the road to disarmament.

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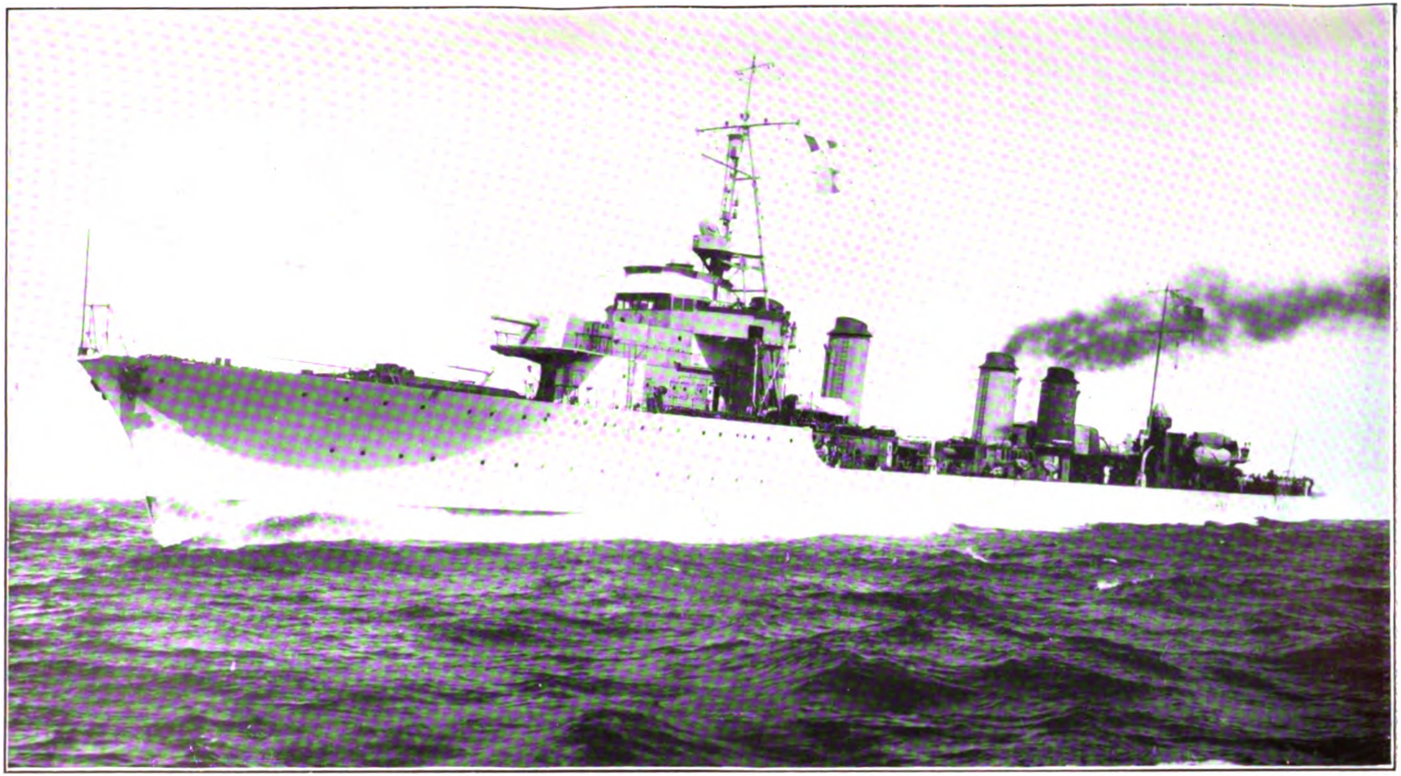
* *The Times*, February 15, 1930, but the *Statut Naval* figure is 390,000.



[Photo by courtesy of the French Ministry of Marine.

THE FRENCH FLOTILLA LEADER BISON, 2,436 TONS.

One of a class of 18 vessels of 70,000 horse-power, 36–37 knots, and armed with five 5·5-in. guns.

The present strength in submarines is as follows :

	Built.	Building.	Total.
British . .	53—43,331 tons .	19—26,110 tons [*] . .	72—69,441 tons
United States	122—81,039 ,, .	5—10,170 ,, . .	127—91,209 ,,
Japan . .	60—60,497 ,, .	7—11,550 ,, . .	67—72,047 [†] ,,
France . .	43—28,071 ,, .	47—49,715 ,, . .	90—77,786 ,,
Italy . .	30—16,722 ,, .	14—26,543 ,, . .	30—43,265 ,,

Great Britain, United States, and Japan have agreed to an age limit of 13 years for submarines (Annex 1). No submarine shall exceed 2,000 tons or carry a gun above 5·1 inch (Art. 7). But as the United States possessed a submarine of 2,680 tons it was made permissible for each Power to possess a maximum number of 3 submarines not exceeding 2,800 tons to carry a gun of not over 6·1 inch. And again, to cover the French submarine of 2,880 tons, in which the lynx-eyed Italy had detected two 8-inch guns, a convenient clause was inserted for her special retention (Art. 7).

Great Britain, United States, and Japan agreed to a quota of 52,700 tons each. Great Britain has 72 submarines, built and building, with a tonnage of 69,441, and will have to dispose of 17,040 tons, possibly in the form of 17 of the 1918, 1919, and 1920 classes, leaving her with 55, of which 7 will be " over age."

The United States is largely overstocked. She has built and building 127 submarines of 91,209 tons, and has 38,509 tons to get rid of, which will probably take the shape of the 76 submarines completed before 1921, leaving her with 51 submarines of which 31 will be " over age."

Japan, to bring herself down to her quota, will have to discard 19,347 [‡] tons, which may take the form of the 28 submarines prior to 1923.

This will give her 42, of which 4 will be " over age." She may also anticipate replacement to the extent of 19,200 tons (Art. 20 (*d*)), of which not more than 12,000 tons shall be complete before December, 1936. France is a staunch believer in the submarine. Under the *Statut Naval* she is building 96,000 tons of large, and 30,000 tons of small submarines, which will mean a fleet of some 150 submarines, much the biggest submarine fleet in the world and a big menace to any Power which may not be on friendly terms with France. This large fleet is not going to help the cause of disarmament or of peace. Of her present fleet of 90, 40 are of a smaller type, evidently designed for work in her home waters. This might take the form of coastal defence, but the experience of the War has shown that the submarine is by no means suited for this work on account of its slow speed and its inability to navigate submerged in coastal waters with any degree of certitude. Its principal sphere lies undoubtedly in the attack of commerce, and an exceptional tonnage " invested " in submarines by any Power is bound to force other Powers to increase their strength in destroyers and light craft.

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[*] Including 3 of 1930 programme.

[†] These are figures in " Fleets," 65. *The Navy*, September, 1930, quoting the Japanese Asst. Naval Attaché, gives 71 boats of 77,842 tons.

[‡] *The Navy*, September 1930, 257, says 25,142 tons.

Nor must too much reliance be placed on the clause (Art. 22), signed by all the Powers and with no limit of time, which requires submarines " to conform to the rules of International Law to which surface ships are subject." This clause does not entirely prohibit submarines torpedoing merchant ships, for an express exception lies in the case of " persistent refusal to stop or of active resistance to visit and search," a contingency which would include the use of defensive armament in merchant vessels.

Italy possesses 44 submarines built and building, of which 25 will be " over age," under the Treaty definition, in 1936.

AIRCRAFT CARRIERS.

Under the Washington Treaty (Part IV) an aircraft carrier was defined as a vessel of war with a displacement in excess of 10,000 tons, so that vessels smaller than this were technically according to the strict wording of the Treaty not air carriers at all. This gap is now filled. Under Article 4 of the London Treaty the expression " aircraft carriers " includes any surface vessel designed for the exclusive purpose of carrying aircraft (Art. 3), and it proceeds to forbid aircraft carriers of 10,000 tons or less carrying a gun of over 6·1 inch. The upper limit of tonnage (27,000 tons) laid down in the Washington Treaty (Art. 9) remains unchanged. So do the tonnage quotas —for the U.S. and Great Britain 135,000; for France and Italy 60,000; for Japan 81,000 tons. The present strength built and building is: Great Britain 8 of 104,750 tons; United States, 4 of 90,086 tons; France, 2 of 32,145 tons; Italy, 1 of 5,000 tons.

NO-LIMITATION VESSELS.

From a defensive point of view, it is important that the right to build small vessels should not be restricted in any way. Article 8 of the Treaty permits certain vessels to be built without any limitation whatever. First come all vessels under 600 tons, which includes units of the trawler type which performed such yeomen service in minesweeping and coastal escort in the War. Then come vessels between 600 and 2,000 tons, which can be built without restriction providing they are not armed with, (1) guns over 6·1 inch; (2) more than four guns above 3-inch; (3) torpedoes; nor (4) have a speed of over 20 knots.

This article permits the building of any number of such vessels as sloops, and P. boats, which were very effective in anti-submarine work, though the restriction in speed to 20 knots, introduced in order to prevent the unlimited building of a destroyer type, is disconcerting, for speed is often the essence of anti-submarine work, and a limit of 24 knots would have been more acceptable.

SAFEGUARDING CLAUSE.

In spite of the real results achieved, the inability of France to bind herself to any figures hung over the Conference like a cloud, and to meet it Great Britain felt constrained to retain the right to adjust her programme in relation to the strength of European Powers. It was not a proposal that commended itself to the American delegates,* but the pressure of British opinion was strong, and it found a necessary place in the Treaty in Article 21. It provided that if " the requirements of national security " in respect of cruisers, destroyers, or submarines are " materially affected by new construction " of any Power other than those who have joined in Part III,† then the Party concerned will notify to the other Parties the increase required to be made, specifying particularly the proposed increases and the reasons therefore, and shall be entitled to make such increase. This gives a large increase of elasticity to the Treaty, and is merely a form of insurance against the possible deterioration of the situation in Europe. So it was regarded in America when the Treaty passed the Senate and was ratified by the President on July 22, 1930.

In Europe Mr. Gibson has been toiling to find some formula of appeasement which will bring France and Italy within the circle of cruiser limitation, but his task is not an easy one. Their policies in Eastern Europe are in opposition.‡

The Troubles of the Treaty.

The Treaty has arrived safely in port but it encountered many shoals and shallows on its way.

Mr. Shearer certainly found no foothold at St. James's, but there were writers, vivid and pertinacious, whose criticisms echoed through France. The conceptions and aims of the Powers were different and remain so. America's aim was simple. She asked for Parity; she got it, and was content when she attained it. But in France the ruling conception is not disarmament, but security, firmly based on concrete sanctions in the specific form of ships ready to sail, tanks to roll, and bombing planes to go up. No one can fail to admire the great qualities of the French. They are realists of the first order. The Englishman seizes on an emotion and tries to convert it into a European creed. The Frenchman thinks out a policy and presents it as a doctrine for the whole wide world. His doctrine is logical and is this: Before arbitration can replace war and before armed forces can be cut down, a definite pact must be made, not after the order of Mr. Kellogg, but quite otherwise, providing for immediate war against any nation that threatens the present order. Peace is to be secured by the menace of war. The French are only partly right. There is a form of security based on goodwill, and it is the business of diplomacy to secure that goodwill, not to sit like Berchtold at the feet of Conrad weaving spells of future war. Here lies the virtue of the Kellogg Pact which insists on a diplomacy of peaceful method. Out of the negotiations came a definite statement by the Prime Minister against the entanglement of military alliances.* But in spite of it the course of the Conference was being gradually deflected at one time,† not towards disarmament but towards a formula of security by means of armaments. Finally, on March 31, an official statement was issued by the British that "any attempt to undertake further military commitments is out of the question." ‡

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* " Pertinax " (M. André Géraud) in *Echo de Paris*, April 12, 1930.

† *I.e.* other than Great Britain, United States and Japan.

‡ See *The Times*, "France and Italy," Nov. 7, 1930.

The fact is that in view of the Kellogg Pact, which means the quest of peace by the determination to remain at peace, the cumbrous provisions of Article XVI of the Covenant have become partly obsolete. On the other hand, it would be equally futile to think that the change wrought on humanity since 1918 is so great that force has no longer any place in the polity of the world.

The fervent pacifist who wishes to subordinate all reality to emotional values is just as wrong as the ardent marshal who interprets the whole cosmos in military terms. When one finds men like Hitler striving for the cancellation of the Versailles Treaty by means of force, one is constrained to agree with the French point of view, and with their firm belief in armaments and sanctions and all the array of force. And it was President Wilson's view. "Armed force is the background of this programme," said Wilson on February 14, 1919.§ War may sometimes be necessary. There is no absolute assurance of peace in total disarmament. "Great Britain could have escaped the War only by denying at once her obligation, her honour, and her interest," says Bernadotte Schmitt, one of the world's authorities on the subject.||

Force, then, still has a part to play in human polity.

> Besides the power it has to fight
> The spirits of the shady night,
> The same acts that did gain
> A power must it maintain.

But the necessity for it can be greatly diminished, if nations can be converted to the principle of the Kellogg Pact and with the help of a new and wiser diplomacy establish a process of gradual disarmament. Towards this end the London Treaty has supplied a notable contribution.

ALFRED C. DEWAR,
Captain, R.N.

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* *The Times*, March 10, Prime Minister's broadcast.
† *The Times*, April 4.
‡ *The Times*, March 31.
§ I. M. Spaight, "Pseudo-Security," p. 18.
|| "The Coming of the War," Bernadotte E. Schmitt, 2 vols., 1930, vol. 2, 402.

CHAPTER V.

AMERICAN NAVAL POLICY.

PRIOR to the Washington Conference there was no formally enunciated naval policy of the United States which had received the approval of the Secretary of the Navy and the sanction of the President.

Yet an American naval policy had often been proclaimed in the public utterances of our Presidents and other statesmen. In substance it was—

" To maintain a Navy adequate for the National Needs."

The term " adequate " enjoyed and suffered many interpretations during the course of over a century, which ranged from the almost total emasculation of the nation's sea forces in the decade following the Civil War, to the birth of the modern Navy at the close of the nineteenth century.

There is a popular misconception, both in America and abroad, that the doctrine of Parity is one which sprang full grown from the Conference table in 1922. While it is often difficult to trace the origin of State policies, in a republic it is the President alone who can promulgate a foreign or military policy. And as far back as 1826 we find President Adams (who by the American Constitution was Commander-in-Chief of the Army and Navy) in his annual message to Congress outlining a naval policy, which, in principle at least, was ever afterwards adhered to and often reiterated by his successors in office.

" The gradual increase of the Navy was the principle of which the Act of April 29, 1816, .was the development. . . . It was a declaration of that Congress to their constituents and to posterity that it was the destiny and the duty of the United States to become in regular process of time and by no petty advances a great naval power."

In 1915 the General Board of the Navy sought to clarify the principles that had been thus voiced in the early days of the Republic, and made the following specific recommendations to the Secretary of the Navy regarding the Naval Policy of the United States :

" The Navy of the United States should ultimately be *equal* to the most powerful maintained by any other nation of the world. It should be gradually increased to this point by such a rate of development, year by year, as may be permitted by the facilities of the country, but the limit above defined should be attained not later than 1925."

While the diplomatic doctrine of parity had not yet been evolved, it is interesting to note that 15 years ago its synonym, "equality with the most powerful," was the cornerstone of an official recommendation by the supreme board of naval advisers.

After the Washington Conference in 1922 the following was officially adopted as the fundamental naval policy of the United States: "The Navy of the United States should be maintained in sufficient strength to support its policies and its commerce and to guard its continental and overseas possessions."

In his annual report to the President that year the Secretary of the Navy said in part: "It (the naval policy) should be true for all times and under all conditions."

It would appear then that the London Treaty has in no wise modified the fundamental naval policy of the United States. However, the parley at the British capital, as well as future negotiations in kind, may have a profound influence upon the interpretations of these broad principles.

Any discussion of the future naval policy of a republic should embrace a survey of the group opinions of its electorate. Moreover, it should be borne in mind that the ruling god of the American democracy is Publicity—as was evidenced recently in the bitter Senatorial fight for access to the diplomatic correspondence leading up to the London negotiations. It should be remembered also that the American mind has a traditional susceptibility to "catch" phrases and slogans. A final word of caution—there is nothing more fickle or fluid than public opinion in a democracy. This was instanced in 1927 when a submarine tragedy apparently influenced drastic curtailments by Congress in appropriations for warship building programmes. Subject to the foregoing qualification, an attempt will be made to explore the various elements of opinion that may be expected to influence the future interpretations of American naval policy.

Unlike the closely-knit United Kingdom, composed of a sea-conscious race, the United States is a vast continental territory of which only a fraction touches the seaboard and many of whose inhabitants in the course of a lifetime never see a war-craft. There is consequently an appreciable number of American citizens who view with apathy the entire naval problem.

Those who interest themselves greatly in the question of naval defence may be broadly classified as follows:

First, there is a numerically small group of super-pacifists who preach the gospel of internationalism. To them the spirit of nationalism is anathema. The more articulate of this group constitute the "Disarmament by Example" enthusiasts. While there has never been a President or responsible statesman who subscribed to the doctrine of these zealots, it would be untrue to say that numbered among them are not many earnest and well-informed individuals. Their sincerity rarely is open to challenge; their wisdom oftentimes may be questionable. In war vessels they see only the costly anachronisms of racial jealousies and national hates, whose disappearance from the seas would usher forth the era of universal peace. To them the warship is neither symbol nor symptom; it is the First Cause. Possessed of a fixed idea to rid mankind of all armament burdens, they pursue their course apparently heedless of any practical obstacles.

Second only to the naval abolitionists are the so-called Small-Navy group. They range anywhere from individuals who would make of the United States Navy (and all other navies for that matter) a maritime police force, to those persons who advocate merely a sufficiently strong navy to keep the invader from our shores. Among this group are many converts to the doctrine of theoretical parity. Parity and Reduction is the two-sided tom-tom used to drown out all opposition. No issue can be taken with either of these commendable aspirations. The error appears to lie in assuming that both can be obtained simultaneously, for there is an increasing number of competent observers who believe that parity is the forerunner of reduction and before the latter can be attained the first must be secured. Since many of these dual advocates are unwilling to pay the price, it, in fact, amounts to parity on paper accompanied by reduction in actuality. With them the question is solely one of prestige. Theirs is an emotional attitude, not a result of any reasoned conclusion as to the genuine necessity, or even desirability, of parity. While demanding parity in principle as a *right* they would disavow any responsibility to build or maintain it.

Third, what are often denounced as the Big-Navy group constitute a professional element buttressed by those legislators and publicists who view the destiny of the United States from a practical angle. To them the doctrine of parity (or to choose the older expression "Equality with the most powerful") is grounded upon something more substantial than the flag-waving sophistry of prestige. Of course, this may be included as an additional justification, but surely no body of responsible statesmen would rest their case in the great court of international opinion upon such a capricious foundation. Yet, unfortunately, it is the erroneous assumption of many able foreign commentators that America's demand for Parity with the strongest stems directly from a desire to satisfy national pride. To any student of American history, or to any one moderately acquainted with the traditional and contemporary policies of the United States, parity is more than any mere right. It is a solemn national—yes, and international—obligation. And the reasons for the real steel fleet as opposed to a paper navy are at least fourfold:

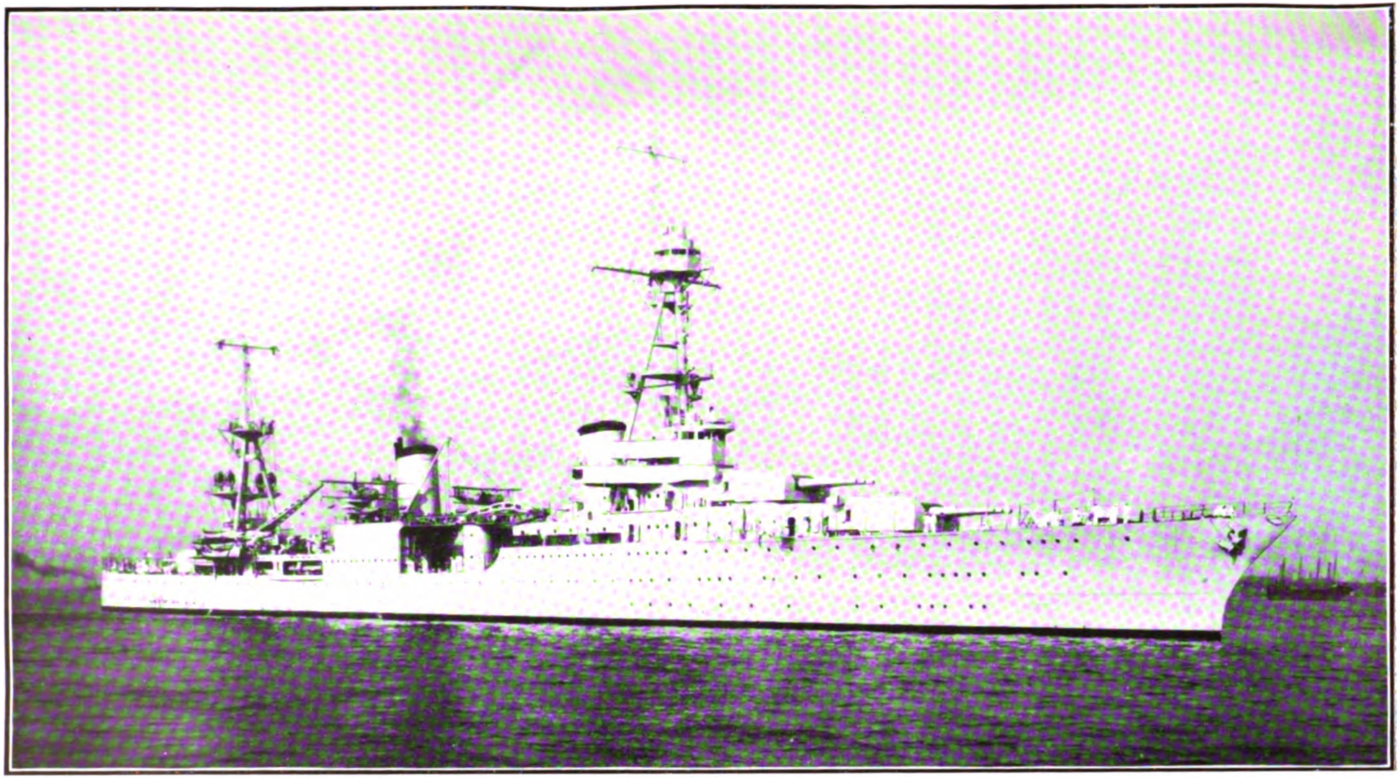
(1) The advocate of a completely built Treaty Navy for America adheres to the policy of our first President. He believes that history has abundantly proven the wisdom of George Washington's utterance:

"To an active external commerce the protection of a naval force is indispensable. To secure respect to a neutral flag requires a naval force organised and ready to vindicate it from insult or aggression. This may even prevent the necessity of going to war by discouraging belligerent powers from committing such violations of the rights of the neutral party as may, first or last, leave no other option."

This farsighted pronouncement, coupled with an earlier statement, " To be prepared for war is one of the most effectual means of preserving peace," sounds almost prophetic of the first formally enunciated American naval policy: " The Navy of the United States should be maintained in sufficient strength to support its policies and its commerce." That commerce, to-day, rivals that of any other Power. The policy continues—" to guard its continental and overseas possessions." When we recall that its " continental possessions " are comparable to that of any other nation, and that, moreover, the world balance sheet shows the United States a creditor nation to the extent of 27 billions of dollars owed by 57 widely-distributed foreign nations, it will be plain that there is more at stake in these " overseas possessions " than geography would indicate.

(2) Or if the foregoing reason sounds too grossly materialistic let us consider another more idealistic, but equally sound, cause for the United States building up her Navy to the limits allowed by the London Treaty. Through her official spokesmen, the Presidents, America since the World War has advocated consistently the limitation and reduction of naval armaments through mutual international agreement. In recent years she has assumed the rôle of leading naval reductionist. As evidence of her sincerity, at Washington in 1922, America made altogether the heaviest sacrifices in modern and completed tonnage. From a potential superiority in capital ships over any other nation the United States reduced to an actual inferiority with reference to Great Britain. This fact was tacitly conceded when, eight years later, at London, a new treaty on the basis of Combat Parity provided for the scrapping of five British capital ships of 134,000 tons to three for America of 70,000 tons. What followed in the United States as a result of America's very genuine sacrifices in 1922 ? For nearly a decade the " Disarmament by Example " enthusiasts had full sway. Only after the regrettable Geneva failure was a partial step taken towards rejuvenating America's waning naval strength. A stern chase is apt to be a long one, and the United States entered the London Conference plainly deficient in auxiliary combatant vessels. Certainly one lesson should have been driven home to the American people as a result of these negotiations—the vanity and futility of the belief in " Disarmament by Example."

If then the United States aspires to the rôle of leadership in naval reduction and desires to see the fulfilment of her cherished and widely-proclaimed ambition to *reduce* naval armaments, she must make ready *now* to send her plenipotentiaries to the next conference with, at least, the purchase price of admission. For America cannot adopt a policy which she proclaims as idealism so long as the majority of humanity views it in the less altruistic and more cynical light of apathy and economy. In 1922 the World Naval Power was allocated with respect to the *status quo* having due regard for national rights, commitments and legitimate aspirations. America, by failing to maintain the force allotted, was unable, in 1930, to perform a real service to the human race by setting a further example in naval reduction. It would seem, there-



[Photo by courtesy of the U.S. Navy Department.

THE UNITED STATES CRUISER HOUSTON, 10,000 TONS.

Completed 1930, and to be Flagship, Asiatic Fleet.

fore, that the wise and sincere pacifist, regardless of the flag to which he owes allegiance, will favour United States warship construction between now and 1936 to a degree that will restore her to a first-rank position.

(3) Closely allied with the foregoing reason for building up to the London Treaty is one of propriety that is too often overlooked. If the United States continues to neglect her sea forces any sudden move to build up to Parity would create suspicion abroad no matter how pacific were her intentions. Besides inviting international distrust, the policy of intermittent neglect on the one hand and feverish naval construction on the other, is in sharp contrast to the wisdom and economy of orderly and progressive building programmes.

(4) That historic issue, freedom of the seas, is a more formidable reason than any yet advanced for the acquisition and maintenance of a complete Treaty Navy by the United States. It is perhaps the single remaining key to serious friction between the two great English-speaking nations. Command of the seas and freedom of the seas are two doctrines ever irreconcilable.

So long as the two great naval Powers remain the respective champions of two conflicting sea policies, substantial parity between them should be maintained. For it was the conflict of these policies that caused several grave crises from 1914–1916. And it was the inability of one of these powers to insist upon her traditional policy of the freedom of the seas that provoked the German submarine reprisals, and thus, in the end, forced America into the World War.

On occasion statements have emanated from uninformed quarters that the United States, upon her entrance into the World War, forgot her traditional attitude when neutral and invoked the extreme rights of a hard-pressed belligerent. Such misrepresentations are contrary to fact. As a specific instance neither as neutral nor belligerent did America endorse the so-called Kirkwall practices. It has been represented that the German submarine menace was responsible for the routing of neutral commerce into port, in order to exercise without unnecessary danger to shipping the right of visit and search. Unquestionably this stand was well taken. With regard to the long and often annoying delays to shipping, while retained in port for examination, it has been pointed out that these were occasioned by deceptions on the part of traders and dealers. Undoubtedly there were instances of this nature. Yet, for these very reasons, America, in her championship of the freedom of the seas, may have perhaps an especial need for cruisers, when neutral, in order to place her commerce under the chaperonage of a naval escort, who would be responsible jointly for its safety and its compliance with the rules of International Law.

When we recall the constantly reiterated public utterances that the United States has no need for a Navy equal to that of Great Britain, and that a theoretical parity is adequate, we are constrained to remember what such an attitude has cost us in 1812, 1914 and 1917. Without laboring the point it would seem, therefore, that in the future we should shape our policy more in accord with the dictates of experience.

A corollary of the freedom of the seas is the freedom of trade opportunity. That this has long been an American principle is manifested in her policy of the " Open Door " in the Orient. Past discussions of this question have been too voluminous to warrant extensive comment here. Yet, with the increasing competition for world markets and the ever-mounting trade between the United States and nations of the Far East, there is little likelihood that the United States will ever voluntarily abandon this policy.

In the writer's opinion there is still a further reason for the actual parity principle—one offered with considerable hesitancy since it is a personal conviction and is, by no means, representative of American naval opinion. It is submitted here as an interesting sidelight as well as perhaps a cogent reason for American naval equality with the strongest.

Briefly, the United States has a certain moral obligation to maintain the strength apportioned her by international agreement, if only in order to sustain world equilibrium. For it is a truism that great rights can never be divorced from commensurate responsibilities.

Referring to the years 1914–1916, even before our naval status had received world sanction, Colonel E. M. House made this observation : " Given a large and efficient Army and Navy, the United States would have become the arbiter of peace and probably without the loss of a single life."

A short estimate of the London Treaty viewed from the angle of both its proponents and opponents in the American Congress might be pertinent.

American advocates of the Treaty justified the agreement reached on five accomplishments :

(1) Immediate combat parity with Great Britain.
(2) Substantial saving of money on account of the extension of the battleship holiday.
(3) Ending of competition between the three great naval Powers by the extension of the limitation principle to all categories.
(4) The promotion of better international relations by allaying fear, suspicion, and distrust.
(5) Actual reduction in tonnage achieved in certain categories.

Needless to state the opponents of the Treaty did not subscribe completely to this estimate. They considered that something more was involved in the principle of naval equality than simply combat parity. Others construed the battleship holiday extension more in the nature of a postponement of expenditure rather than an actual saving. Still others felt that quality would succeed quantity in the field of competitive effort.

To do full justice to the Treaty opponents, their opposition was more fundamental than would be indicated from the above or from the carping criticism that too frequently has been ascribed to them by many publicists. In the Senatorial fight that preceded ratification, the Treaty was challenged as being in violation of at least two well-established principles.

First, the 5 : 3 ratio with regard to Japan was bought in 1922 at the price of America's refraining from further fortifying her possessions in the Eastern Pacific. It was represented that this ratio applied to all categories and the abandonment of this principle should not have been acceded to without a corresponding revocation of the *status quo* in the Pacific.

The second principle involved was the subdivision of the cruiser category. On its face this appears to be a small issue. Yet it is a fact that American Naval Policy since 1922 has embodied the provision: "To build no small cruisers." This provision derived from the conviction that America's naval needs required cruisers of the larger 10,000-ton eight-inch-gun variety. Nor is the reason for this hard to find. It is largely predicated upon the fact that, each naval Power having been made so predominant in its own part of the world, any future conflict at sea between these Powers will resolve itself primarily into a warfare upon commerce—as in fact most naval campaigns have been in the past. Remembering, now, that the United States is the only great naval Power that possesses no battle-cruisers the issue becomes somewhat clarified. The Battle of Coronel proved conclusively the superiority of the eight-inch-gun cruiser over the six-inch-gun cruiser. In like manner the Battle of the Falkland Islands demonstrated the supremacy of the battle-cruiser over the eight-inch-gun cruiser, although the latter did substantial but not serious damage to the two British battle-cruisers. These battles taken together illustrate that while six-inch-gun cruisers are but poor opponents of eight-inch-gun cruisers, the latter may, on occasion, and did, prove of considerable value against the battle-cruiser. The action off the Falkland Islands lasted for over four hours before the German eight-inch-gun cruisers were sunk. The inference is plain. In commerce warfare such a respite to a convoy under many circumstances might ensure its safety.

But there are at least two other considerations that led to American insistence upon the eight-inch-gun cruiser. Britain has, as the world knows, a considerable advantage in merchant vessels capable of conversion into fast six-inch-gun cruisers. While not so formidable as cruisers of the regular type, they would be effective units as commerce raiders. It was Britain who built the first large-gun cruisers of seven and one-half inches to combat the German commerce raiders.

The remaining factor that caused American naval opinion to favour the larger cruiser in an effort to reach parity with Great Britain was the much discussed question of naval bases, of which America has 7 and Great Britain 26.

Many eminent British statesmen have represented that Britain's far-flung domain necessitates certain peculiar naval needs of the Empire. Many prominent American statesmen believe that the present Dominion organisation is definitely a source of Empire strength, so long as there exists throughout the world strategic naval bases under the British flag. At any rate American superiority in large-gun cruisers cannot constitute remotely a menace to England's food lanes. With the granaries of Europe and Asia separated from her by only a narrow body of water it would be as feasible to show wherein British sea-power could bring starvation upon the United States. In fact, since America actually imports more food than it exports, and since the two raw materials most essential for trans-continental shipments (manganese for steel rails and rubber for automotive vehicles) are not produced in sufficient quantities in the States to supply America's normal needs, such a theory might furnish the basis for academic speculation. But the main thought is that, had America been awarded a marked superiority in large-gun cruisers, Britain's lines of vital communications, by no conceivable circumstance, could have been jeopardised.

Since British superiority in naval bases has the practical effect of multiplying the number of her cruisers, since she possesses three battle-cruisers which might be employed in trade warfare, and since she has a definite superiority in merchantmen readily convertible into six-inch-gun cruisers, it can be appreciated that parity in trade protection is not envisaged by the London Agreement. It was for these reasons that the advocates of the eight-inch-gun cruiser in the Senate fought so long and strenuously for a policy that had been in effect since the limitation of naval armaments first came upon the world stage.

The sea-minded British public will appreciate the fact that in its broadest implications the issue is primarily economic. Sea power has been the wealth and strength of the Empire since its inception. Conditions are not dissimilar in the United States. In one century America has grown from a trackless wilderness to a great importing and exporting nation. The number of American citizens who are dependent upon external and sea-borne trade is considerable. In a campaign speech, in 1928, Mr. Hoover stated : " Our total volume of export translates itself into employment for 2,400,000 families. . . . And in addition to this, millions more families find employment in the manufacture of imported raw materials." No person will question the sovereign right of a nation to afford adequate protection to the livelihoods of its people.

The United States desires no naval supremacy to overawe the world and force upon it her ideas, commercial and otherwise, ideas which may be (and likely are) totally unacceptable to other nations. Moreover, the better-informed of her citizens have little patience with the Anglophobes and calamity prophets who " view with alarm " the very commendable efforts of Great Britain and Japan to balance their allotted fleets by auxiliary construction.

Speaking from London to an American radio audience on February 19, 1930, Senator Joseph T. Robinson, one of the American delegation said : " The American people in the main realise that permanent peace is inseparable from confidence in security."

There is something substantial and comforting to the people of a nation in the great mobile units of a modern fleet. These imponderable factors come in time to be viewed as the natural bulwarks of a country. If the citizens have faith in their potentialities they feel secure and tend to grow conservative. As has been stated elsewhere a nation's dreadnoughts bear a striking analogy to the gold reserve of a great banking institution. The more conservative the institution the greater the reserve and the less likely that it will be drawn upon. In the days of prosperity and plenitude it lies dormant. Yet it is consoling to know that it is available if, and when, the hour ever strikes. Mr. Robinson, an astute student of American public opinion, no doubt appraised accurately his countrymen's attitude with his reference to the compelling necessity of "confidence in security."

Certainly then it would be inequitable to condemn the nationals of other sovereignties for a similar conviction.

Wholly peaceable, the United States seeks no territorial acquisitions, no new spheres of special interests. However, she owes it to her own people to have a navy "equal to the most powerful" if only in order to ensure protection to her extensive foreign commerce. She owes it to World Peace to have a navy which will ensure world stability. She needs a parity navy before she again approaches a Conference table where the heaviest casualties are the legacy of the unprepared and numerically weak. She needs a parity navy if her championship of a great but mooted principle is to be respected, and her voice is to be heard in any future conclave before which that issue may arise.

The London Treaty is a matter of history. It is the supreme law of the land and of the sea. It would be idle to deny that the preponderance of those experts who have spent their lives in the study of American naval needs were not enthusiastic over many of its provisions. International agreements are by their very nature compromises and restrictions upon national sovereignty. The wisdom of any such agreement is a matter that history alone can determine. Although bitterly contested in America the United States was first to ratify the London Treaty. The President, Commander-in-Chief of the Army and Navy, lent it his support, advocacy and sanction. He will receive the unquestioned loyalty of his naval subordinates. America now should exercise her new rights, diminished but yet, nevertheless, substantial, and build to the limit permitted her under this treaty.

At this writing no specific recommendations of the General Board have been made public. And it would be idle to indulge in speculation as to any technical possibilities. There is every assurance that the Navy Department will lay before the Congress a comprehensive programme and that it will be moderate, orderly and constructive, looking towards the eventual restoration of American naval equality: This does not necessarily comprehend the immediate laying of every keel sanctioned by the London agreement. Not only would the dockyards be unable to meet such a demand, but wisdom would indicate progressive building with an eye towards future technical developments.

Spokesmen in the National Legislature have indicated that such a programme will receive the sympathetic consideration of that body. Not until after the fall elections and the convening of Congress will anyone know the full purport of American naval intentions. One thing is reasonably certain, however. The "Disarmament by Example" enthusiasts have had their day in court. It has been a long one, but they have been thoroughly repudiated. For it is a growing conviction in America that the world is not now ready, nor is it likely to become so internationally-minded before 1936 as, to accept a spiritual ideal so little in accord with mundane experience.

In conclusion it may be stated that the long negotiations at London rendered a signal service to the American public. The press exploited every detail of the proceedings and through daily headlines many people remote from the seaboard became acutely aware of their naval deficiencies.

American publicists are alive to the unfortunate results of eight years of naval inaction and are determined that the attitude of *laissez faire* shall no longer dominate the naval policy of the United States.

CHARLES GODWIN MOORE
Lieutenant, U.S. Navy.

CHAPTER VI.

THE GERMAN NAVY.

ITS PRESENT POSITION AND PROSPECTS.

BY the peace treaty of Versailles, Germany is denied the right to maintain those protective and defensive forces which, according to her own calculations, are necessary for the defence and protection of the country.

In the post-War period, other states have also imposed restrictions upon their defence forces by international treaty (*vide* Washington, 1922); but this has been done after exhaustive discussions between parties with equal international status, and after careful examination of their military and political positions; more than this, the treaties only apply to particular zones and weapons. The size and strength of Germany's forces have been settled by the Allied and Associated Powers at Versailles without consultation with German representatives or experts. The result was that Germany's military and geographical position in Central Europe was not sufficiently considered and that German defence forces are much too weak to protect German frontiers.

The states bordering on Germany possess forces that are not restricted in number, together with armies and fleets equipped with the latest weapons and far more powerful than Germany's defence forces by reason of their strength and *matériel*. This unsteady military equilibrium is naturally a great danger to the freedom and future of Europe, and is moreover in contradiction to Article 8 of the League of Nations Pact, in which the contracting parties specifically recognise that peace is to be maintained by reducing armaments.

The peace treaty restricts the German Navy to the following maximum figures of ships in service, personnel, and replacement building. The highest number of forces in commission allowed under Article 181 is:

6 battleships of the "Lothringen" or "Deutschland" class.
6 light cruisers.
12 destroyers.
12 torpedo boats.

Vessels in service must only possess a certain number of weapons, and munitions either on board or in stock (Article 193). Submarines may neither be built nor maintained even for commercial purposes (Articles 181 and 191). Unless a vessel is lost by accident, replacement ages are fixed at 20 years for battleships and cruisers, 15 years for destroyers and torpedo boats; the ages are calculated from the date of launching (Article 190). Armoured ships must not displace more than 10,000 tons, cruisers not more than 6,000, destroyers not more than 800, torpedo boats not more than 200. The numerical strength of the navy must not exceed 15,000 men, of which no more than 1,500 may be officers and warrant officers. Recruitment is to be effected by voluntary enlistments; officers and warrant officers are to engage for at least 25 years, petty officers and men for 12 (Article 194). The yearly contingent of recruits must not exceed 5 per cent. of the total personnel.

All fortifications on the North Sea coast are to remain in the condition in which they were when the Treaty of Versailles became effective. The defences of the Kaiser Wilhelm Canal and those of the war harbour of Kiel are to be destroyed. The defences of Heligoland are to be destroyed and may never again be re-erected (Article 115). No fortifications may be laid out or maintained within the coastal zone bounded by the meridians of 9 degrees (Elbe) and 16 degrees East (Kolberg) and by the parallels of 54 degrees and 55 degrees North latitude (Article 195). The fortress of Swinemunde is not affected by this condition. No military aeroplanes may be maintained by the Navy (Article 198). The German Navy is being built under these restrictions.

THE DEFENCE LAW.

By the law of April 16, 1919, the President of the Reich was empowered to release the old formations of the Navy and to create a new naval force for the purpose of protecting the German coastlines by mine-sweeping and patrolling; of securing the commercial routes, of protecting the fisheries, and of giving effect to the orders of the central government by maintaining order in collaboration with the army. The Navy was given its final legal basis by the defence law of March 23, 1921, which defined its position, and that of the army, in the defence forces of the Reich. This law constitutes the navy into sea and land detachments (§ 6); the fleet is to consist of six battleships, six light cruisers, twelve destroyers, and twelve torpedo boats. On this head the provisions of the Versailles Treaty have been transferred, word for word, into the defence law. The President is the commander-in-chief of the defence forces; under him, the defence minister exercises effective command over the defence forces. An admiral—the chief of the Marineleitung *—is at the head of the navy.

During the last ten years the organisation of the navy, of the defence ministry, and of the military commands has been derived and developed from this legal basis. That development consists of using whatever the Great War has left of personnel and material, in so far as the Versailles Treaty allows. After a brief service by Admiral von Trotha, Admiral Behncke continued the work.

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* The Marineleitung means literally "naval directive body"; it is a word which combines the ideas of administrative and executive control.—TRANSLATOR'S NOTE.

Admiral Zenker, his successor, completed the organisation, which, however, has been altered recently (February, 1930).

A few remarks about the military position of Germany should be added before this organisation is described in detail. Owing to its inferiority with regard to the armies of neighbouring states, owing to its feeble equipment, owing to its lack of modern weapons (aircraft, submarines, heavy artillery, and tanks), the German defence force cannot be treated as an instrument of an imperialistic policy, and can only be used for two very restricted purposes: (i) for protecting the German Reich against raids; (ii) to protect German neutrality if other powers are at war.

In ordinary circumstances the first of these two cases seems improbable. Nevertheless, brief reflection on the history of the ten years following the War shows that the possibility at least exists for powerless or disarmed countries. The *coups de main* on Wilna and Memel are examples.

The other case—defence of neutrality—is always conceivable. The peace of the world is protected by powerful forces which have found expression in the League of Nations, the Locarno and Kellogg pacts, and in the idea of a united Europe. In spite of all this, the most convinced friend of peace must admit that four years of universal war and 10,000,000 dead do not in themselves suffice to secure universal peace for all time.

These considerations are the starting-point of the German defensive organisation. The Reichs navy is a part of the defensive forces, an irreplaceable complement of the Reichs army. It assures connection by sea with East Prussia, now separated from the Reich; the land communications are barred by Poland by means of a strongly fortified strip along the Weichsel. The Navy, therefore, extends the coastal zone and protects the flank of the army from attack by sea; it relieves the army of the duty of protecting its flank and rear and frees troops and artillery for other duties. In the case of assuring neutrality, the Reichs navy secures German harbours and territorial waters against misuse by belligerents.

Naval Organisation.

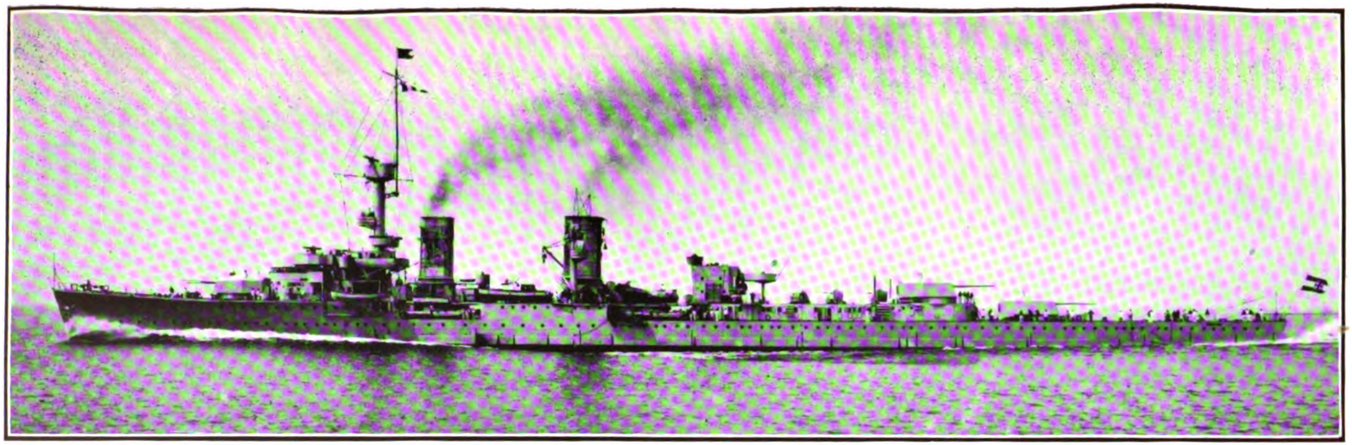
The organisation of the navy has been framed with strict regard to the political and military state of the country. The main point of naval concentration has been moved to the Baltic, which was announced in 1930 by the transferring of the Fleet flagship and the staff to Kiel. The feeble German naval forces are assembled under the orders of the Commander-in-Chief, who flies his flag in the Schleswig-Holstein. They are divided into battleships and reconnaissance craft. The commander of the battle fleet (flagship Hannover) commands only the four ships which constitute the battle squadron. The surveying ship Meteor and two surveying launches are attached to his squadron. The commander of the reconnaissance vessels (flagship Königsberg) commands the cruisers, torpedo boats, and minesweepers. Particular formations are divided in equal numbers between the North Sea and Baltic. The battleships Schlesien and Hannover; the cruisers Emden and Köln; the surveying ship Meteor; the second torpedo flotilla, consisting of ten units and two surveying launches, are stationed in the North Sea.

The battleships Schleswig-Holstein and Hessen; cruisers Königsberg and Karlsruhe; the first torpedo flotilla, consisting of nine units; the minesweeping half-flotilla and the sailing training ship Niobe, are stationed in the Baltic. The coastal zone is divided between the station commands at Kiel and Wilhelmshaven. The Baltic up to the line Skagen—Gotenburg constitutes the Baltic station. The coasts and approaches to the North Sea constitute the North Sea station. The Skagen—Gotenburg line and Kilometre No. 9 of the Kaiser Wilhelm Canal constitute the dividing line between the two stations.

The station commanders are responsible for coast defence, for military supervision, and for intelligence reports. They keep all available forces and defence material ready for use. They are responsible for the training of the ships and troops under their orders and exercise the officers and crews. The various departments of the Navy are subject to inspectional centres which are divided between the Kiel and Wilhelmshaven stations. Kiel is the inspection centre of the education and of the torpedo and mining service. Wilhelmshaven is the inspection centre of naval artillery and naval stores. Coastal defence is based upon fortified works in the islands and the mainland. In the Baltic there are fortifications at Swinemunde and Pillau; in the North Sea at the mouths of the Ems, Jade, and Weser, on the islands of Borkum, Nordeney, Juist, Wangeroog, Spiekeroog, Langeoog, Sylt, and Amrum. The fortified works are manned by the naval artillery corps, divisions of which are stationed in Kiel, Wilhelmshaven, Swinemunde, Cuxhaven, Pillau, and Emden. Drafts for ships in service are taken from the seamen divisions in Kiel and Wilhelmshaven. Recruits are received at these centres, where the needs of the personnel serving afloat are also attended to. There are instructional and repair establishments at each of these personnel centres, where volunteers are taught their technical duties and small craft are made ready for service.

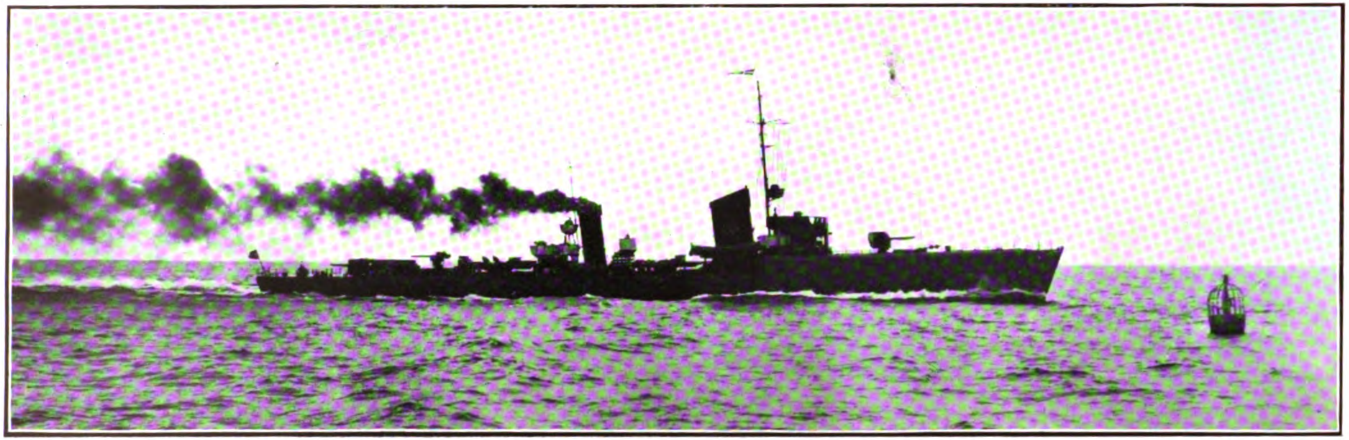
DOCKYARDS AND SHORE STATIONS.

Intelligence and wireless stations are established along the coast; coastguard patrols are worked from these points, which also supply information to warships and merchantmen at sea. These stations are grouped together and placed under naval intelligence officers at Kiel, Pillau, Stolpmunde, Swinemunde, Warnemunde, Neumunster, List, Flensburg, Cuxhaven, Wilhelmshaven, and Borkum. The naval dockyard at Wilhelmshaven, and the naval arsenal in Kiel, where new ships are built, constitute the navy's two great technical institutes. The work of the Wilhelmshaven dockyard, where the largest battleships were built before the war, is now much diminished and is but proportionate to the needs of



[Photo by courtesy of the Navy Office, Berlin.

THE NEW GERMAN CRUISER KONIGSBERG, 6,000 TONS.



[Photo by courtesy of the Navy Office, Berlin.

THE NEW GERMAN DESTROYER ILTIS, 800 TONS.

Germany's small naval forces. The Kiel arsenal is an institution similar to the Wilhelmshaven dockyard, but is not able to undertake new construction.*

There is a nautical and meteorological observatory at Wilhelmshaven, and there are naval hospitals at all the large garrisons. In Kiel and Wilhelmshaven, the highest naval administrations of the province are placed, and are the executive authorities on the two respective naval stations. Spiritual duties are performed by Evangelical and Roman Catholic ministers.

Military jurisdiction has been abolished in Germany, in consequence of which the naval personnel are subject to the legal jurisdiction of the civil courts; the personnel on service afloat are, however, subject to military law.

MATERIAL AVAILABLE IN 1919.

When peace was signed, the German Navy consisted of eight battleships of the "Deutschland" and "Braunschweig" class (Braunschweig, Elsass, Hessen, Preussen, Lothringen, Hannover, Schlesien, Schleswig-Holstein), of eight light cruisers (Niobe, Nymphe, Arkona, Medusa, Amazone, Thetis, Berlin, Hamburg), and of a large number of torpedo craft and special ships. The battleships were already old, and the need of replacing them was recognised. There were half-completed cruisers of the war programme in the dockyards, but, by Article 186 of the Treaty, these had to be destroyed. During the negotiations with the Inter-Allied Commission of Control it was nevertheless proposed that these ships should be completed to replace the unusable old cruisers, two of which were admitted in the Peace Treaty to be due for replacement in 1919.

For unknown reasons the Allied representatives refused to consider the proposal. The consequence was that, in 1921, when the Reichstag approved the first replacement cruiser, the cruiser Leipzig was being broken up at Wilhelmshaven in accordance with the Treaty, and on a set of slips near by a new ship of identical type was being built. There was the same contradictory position in respect to battleships. If in 1919 the Entente Powers had allowed Germany to keep and use several ships of the "Ostfriesland" or "Nassau" class—which were then in German possession—there would have been no need to replace any vessel until the year 1940. It was, however, insisted that the ships should be surrendered in accordance with the Treaty of Versailles, and they have since been broken up abroad or used for target practice.

The naval authorities were compelled to keep obsolete ships, unfit for action, in service for as long as possible owing to the terrible financial difficulties of the Government. The oldest vessels, Preussen, Lothringen, and Niobe were, it is true, not put into service again; the Preussen was struck off the navy list in 1929, and the Niobe was sold in Holland for breaking up. All other vessels have been put into active service for comparatively long or short periods, after having been renovated and improved.

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* The armoured ship Ersatz Preussen has been built at the German works in the locality.

The cruiser Emden, approved in 1920, was made ready for service in 1926, after overcoming extraordinary financial and technical difficulties, which delayed the building. As the cruiser material was in the worst condition, its replacement was attempted first. In 1925–27 the Reichstag approved four new cruiser units. In 1924–26 twelve destroyers were provided. In 1928 the first ship for replacing the battleship was approved—she is known as the Ersatz-Preussen. The approval of this ship gave rise to an acrimonious political controversy. In order to avoid a repetition of this each time that a new ship was asked for, the Reichstag asked for a building programme to cover a longer period. This will be laid before the Reichstag by the Government in 1931. The details of this programme will be explained later.

THE FLEET TO-DAY.

Most of the said replacement vessels are ready. The cruiser Leipzig and the armoured ship will come into service in 1931–32. The state of the battleships, cruisers, and torpedo craft is as follows :

Battleships.	Date of Launching.	
Ersatz Preussen	—	Completing.
Schleswig Holstein	1906	In active service.
Schlesien	1906	
Hannover	1905	
Hessen	1903	
Elsass	1903	Out of service.
Braunschweig	1902	
Lothringen	1904	Reserve.
Cruisers.		
Leipzig	1929	Completing.
Köln	1928	In active service.
Karlsruhe	1927	
Königsberg	1927	
Emden	1927	
Hamburg	1903	Out of service.
Berlin	1903	
Nymphe	1899	In reserve.
Amazone	1900	
Destroyers.		
Iltis, Jaguar, Wolf, Leopard, Luchs, Tiger	1927–28	
Albatross, Falke, Greif, Mowe, Kondor, Seeadler	1926	
Torpedo craft.		
T190, T155, T153, T185, T196	1907–11	
T151, T156, T158, T152, T157	1907–08	
S23	1912–13	
G7, G8, G10, G11	1911–12	

In addition to these ships and vessels which constitute the naval fighting force, the navy has a number of special vessels for various purposes which are not mentioned in the Treaty of Versailles. They were approved subsequent to the Treaty by the Ambassadors' Conference and, with the exception of the gunnery training-ship, must not be armed with guns. The decisions of this Conference permit Germany to possess the following ships :

4 gunnery training ships	Hay, Drache, Delphin, Fuchs.
8 tenders, fishery protection ships and vessels (for experimental work)	Zieten, fleet and station tenders, and Nautilus, Pelikan, Greif.
38 minesweepers	27 actually available.
2 surveying ships	Panther, Meteor.
4 surveying launches	3 actually available.
1 sailing training ship	Niobe.
Barrage vessels—unrestricted	24 actually available.

The navy also possesses the target-ship Zähringen, which is controlled by wireless, together with the fast tug Blitz.

THE REPLACEMENT PROGRAMME.

The replacement programme laid before the Reichstag by the Government in the 1931 budget is spread over the years 1931–36 ; it provides for the building of three additional armoured ships which are to be laid down successively in the years 1931, 1932, 1934 ; provision is also made for four reserve destroyers, five torpedo boats, five patrol vessels, a gunnery training ship, six mine-sweepers, and seven barrage vessels.

The armoured vessels cost 73,000,000 to 75,000,000 marks and take four years to build. Fifty million marks a year are allocated to new building. These much-discussed armoured vessels are necessary in that the seven battleships of the " Braunschweig " class are not adapted for modern offensive weapons (depth-charges, torpedoes, mines, bombs), as they were built at a time when such weapons were not developed (1902–6). The navy cannot perform military duties with such units, and the fighting capacity of the battleships is progressively declining. The cruisers and destroyers are unarmoured and not suitable for effective use in coastal warfare, or for protecting the sea flank of the land army. Only armoured ships of the Ersatz-Preussen type are capable of performing essential military duties. Up to date, the Reichstag has not made any decision with regard to this building plan.

The new ships of the post-War period have been designed after modern conceptions ; their construction has been influenced by the experiences gained in the War and adapted to the altered circumstances of the post-war period. Formerly, the displacement tonnage of new vessels was governed by such military requirements as fighting power, speed, and armour protection, with the result that tonnage steadily increased ; nowadays the German navy is compelled to consider only the fixed maximum tonnage allowed. The methods of construction conceived in German dockyards in 1925–30 have as their object to reduce weight as much as possible, and to construct vessels which are not too far behind foreign ships of a similar class. The cruisers of the " K " class (Königsberg, Karlsruhe, Köln) and the armoured ship Ersatz-Preussen, have been constructed on these lines.

It is obviously impossible for Germany to build armoured ships which are even approximately equal in fighting power to those possessed by the maritime Powers of the Washington Treaty, or allowed to them. The maximum displacement allowed to German ships is 10,000 tons. Other Powers are allowed 35,000 tons.

New Warship Designs.

On account of this immense difference in size, the German Navy has attempted to create a new type of ship which, while possessing a fairly heavy main armament (six 28-cm. guns, sufficient light guns, and four torpedo tubes), shall also have the mobility and radius of action of a cruiser. Her speed is 26 knots, and she is driven by internal combustion motors. This class of ship is naturally more powerful than the Washington cruisers if both are regarded as armoured ships; but it is not on that account logical to regard them as menaces to other Powers. They are ships of the line, and as such are far weaker than those possessed by other countries. Technical authorities all over the world have admitted that the construction of these ships proves that it is possible to build a vessel capable of fighting and resisting as a battle-worthy unit. without building an enormous ship of 35,000 tons displacement. These new ships are perhaps the successors of the disappearing great battleship, in that they are capable of performing all the duties of capital ships.

The "K" class cruisers (Königsberg, Karlsruhe, Köln) may be regarded as well-constructed units. What was done in the case of the battleships was also done in theirs; every superfluous weight was economised in order to increase their fighting strength. Light metals have been used in their construction, welding has been used instead of riveting, and as a result weight has been economised and durability increased. In the case of the Ersatz-Preussen the method saved 550 tons of superfluous displacement. A comparison of the "K" class with cruisers of other nations gives the following results:

Germany .	Köln	6,000	32 knots	9 15-cm. guns, 12 50-cm. T.T.
Great Britain	Emerald	7,700	33 knots	7 15·2-cm. guns, 12 53-cm. T.T.
France . .	La Motte Picquet	8,000	33 knots	8 15-cm. guns, 12 55-cm. T.T., 4 7·5-cm. guns.

The German cruiser, which is slower, therefore possesses a heavier armament than the other two, notwithstanding that she displaces 1,700 and 2,000 tons less.

A Professional Personnel.

In accordance with the Treaty of Versailles, the German Navy is manned by long-service ratings. The exceptionally difficult task of substituting a professional system for the short-service system based on obligatory military duty of the old navy was carried out after the war, step by step; the adaptation has been done with due regard for measures taken previously. But the organisation is even now not totally complete. Germany before the War relied upon universal service, and we rather lack experience of a professional military force.

Every year one German light cruiser makes a long voyage abroad for the purpose of training cadets in seamanship, navigation, and fighting duties. Since 1924 these training voyages have been made to every part of the world, and foreign nations have given German ships an honourable and cordial reception. They are regarded as Germany's envoys of peace and friendship, and, officially and unofficially, assurances have been given on many occasions that the enmities of the world War are over and that a common endeavour must replace them. The world needs peace to heal the wounds of a useless struggle, which has struck Germany down, and left her adversaries neither richer nor happier than they were before it. No state needs peace more than Germany, an unarmed country surrounded by armed neighbours, and scarcely capable of protecting her own neutrality in a conflict.

NORBERT VON BAUMBACH,
Kapitanleutnant,
German Navy.

CHAPTER VII.

CAPITAL SHIPS AND CRUISERS.

THE EFFECT OF THE TREATIES OF WASHINGTON AND LONDON ON DESIGNS.

THE capital ships forming the nucleus of the Fleet with which Great Britain entered the War in 1914 were all of the same type as the Dreadnought, which ship was the outcome of an Admiralty Committee appointed in December, 1904, to fix the type of fighting ship that should be adopted for future building. Naval actions in the Russo-Japanese War of 1904–5 gave valuable information, and this, combined with the latest experience with the newest battleships at sea in the Channel and Atlantic Fleets, enabled Sir John Fisher, the Chairman of the Committee, to draw up the requirements as to number and calibre of guns, the desired protection and the maximum speed which the most powerful ships of the British Fleet should possess. The type ship was closely followed in all the battleships coming after her up to the " Iron Duke " class, the main armament being modified from 12-inch to 13·5-inch guns in 1910 ; and the secondary armament was brought up to twelve 6-inch guns in the " Iron Duke " class. The speed remained at 21 knots through all the succeeding classes. In the " Iron Duke " Class, the last of the series, the length is 580 feet and the standard displacement 25,000 tons, as compared with 490 feet and 18,000 tons of the Dreadnought.

The " Queen Elizabeth " class, designed to form a division of fast battleships, were completed during the first year of the War. Speed was increased by 4 knots, and the 15-inch gun was introduced for the first time. These five ships, with the five " Royal Sovereign " Class, laid down in 1913 and completed in 1916, were the last British capital ships designed before the War, and their construction was completed before any experience was obtained on the behaviour of the ships in action. No British battleship was laid down after 1913 till in 1922 the Nelson and Rodney, the only two ships of the Fleet which incorporate the full lessons of the War, were begun in accordance with the Washington Treaty.

In the Dreadnought, a great advance in offensive power was made, and she became the type ship from which foreign nations also started to build up new fleets ; capital ships followed in classes in Germany, the United States, and Japan as well as in Great Britain, the last vessels of the series being :—

Nation.	Class.	When completed.	Length.	Disp.	Speed.	Main Armament.
Great Britain	Royal Sovereign	1917	621	25,750	23	8—15-inch
America .	West Virginia	1923	624	32,600	21	8—16-inch
Japan . .	Mutsu	1920	660	33,800	23	8—15-inch
Germany .	Bayern	1918	626	28,000	23	8—16-inch

The " Hood " design, started in 1915, was prepared as an answer to the fast, well-armed, and protected battle-cruisers that Germany had under construction at that time. The main armament was made equal to that of contemporary battleships, while the speed was in excess of that of the German battle-cruisers. The battle of Jutland gave valuable information as to the effect of gun-fire and the amount of protection necessary for sides, barbettes, and decks. These particulars of the design were reconsidered and settled in agreement with the Commander-in-Chief of the Fleet. They involved an increase in the angle of elevation of the turret guns, arrangements for preventing flash from penetrating magazines, increase of the protection both in extent and thickness, also special arrangements for the fire and torpedo control. It was not till 1917 that the design was finally approved. Four vessels of the class were ordered, of which only the Hood was completed; the other three, not having reached the launching stage at the date of the Armistice, were broken up on the slips.

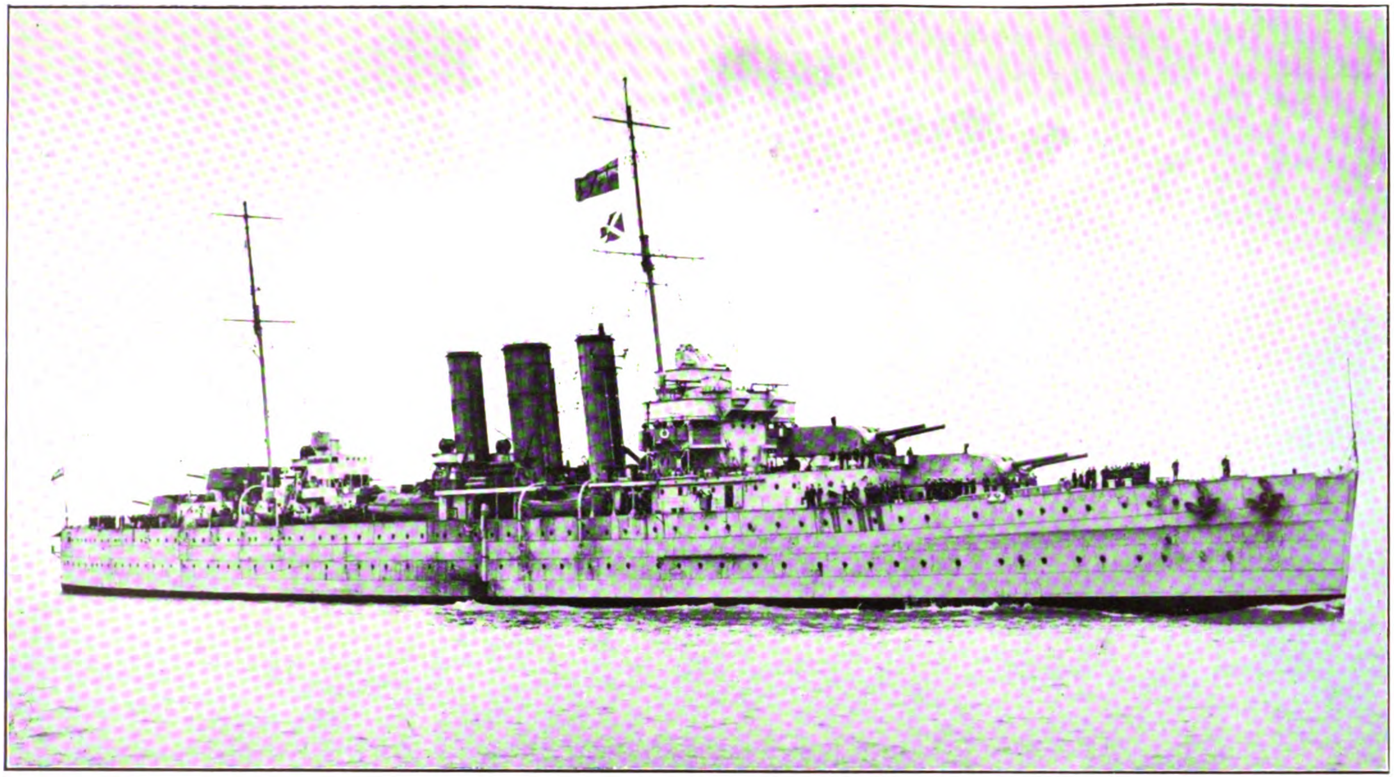
After the Armistice the Naval Staff of the Admiralty, and the technical departments, had time and opportunity to consider fully the many reports that had been received from the Fleet and from individual ships that had been in action, and the surveys that had been carried out on ships damaged by gun-fire, torpedoes, or mines ; full inspection was also made of the enemy ships that fell into our hands. Actual war experience gave definite information on many points which before 1914 were largely matters of opinion based on such experiments as could be made in peace time. The range at which actions were fought was in most cases considerably greater than was allowed for in pre-War designs ; the increased angle of descent of the shell made it necessary to reconsider the disposition of armour on sides and decks, involving the further question of modifications in the quality and mode of manufacture of the armour best suited to withstand the new method of attack. There was also the effect of large fragments and blast from shells bursting inside the ship to consider, and particularly the effect of flash from shell-fire or ignited cordite on the magazines and trunks of heavy gun mountings. The effect of modern torpedoes on the side and bottom of the ship, of mines, attack by bombs and machine-gun fire by aircraft on the open decks and bridges also produced many new problems.

In view of the intricacy and special nature of many of these problems it was much more clearly realised after the War than before, that the naval officers must take much responsibility for fixing the requirements that must be met in the design for a new ship; with the post-War arrangement of naval staff and staff departments, naval officers are specially borne to study the War lessons and the ideas that arise from them, in order that the knowledge so obtained may be utilised in future designs. It is the duty of the Board of Admiralty to consider the balance of gun power, protection, speed, endurance, and other qualities, and many sketch designs are usually prepared and considered in consultation with the Naval Staff before the design from which the ships are built is finally approved by the Board.

Between 1918 and 1921 several designs for a successor to the Hood were considered, and in 1921 four battle-cruisers were ordered, which were intended to incorporate all the lessons of the War to the extent desired by the Naval Staff. These ships had an armament of nine 16-inch guns in three triple turrets and sixteen 6-inch guns in eight twin turrets. The speed was to be 32 knots, the s.h.p. necessary being 160,000. The legend displacement on the basis then in use was 48,000 tons, the corresponding standard displacement as defined by the Washington Treaty being 47,540 tons. The construction of these vessels was suspended in November, 1921, when the preliminary negotiations leading up to the Washington Treaty on the Limitation of Naval Armaments were started, and they were definitely cancelled in February, 1922. A battleship design which incorporated the same War lessons was also well advanced in 1921; this vessel, with still greater gun power and more effective protection, would have had a standard displacement in excess of 48,000 tons. Ships somewhat similar to the above were also under consideration or were being laid down for some of the foreign navies.

At the time when the Washington Conference was called, the tendency of designs for capital ships was thus greatly to increase their size and incidentally their cost, in order to make the ship more powerful than her contemporaries and as nearly as possible invulnerable to all forms of attack that had been met during the War, and to embody also the result of researches that had been made into the developments that might be expected to follow. At the same time there was much popular criticism on the size and cost of existing battleships, and an animated controversy had arisen as to the value of the type itself and the need for its retention in future fleets.

The Washington Treaty for the Limitation of Naval Armaments between the United States of America, the British Empire, France, Italy, and Japan was made in February, 1922, and came into force in August, 1923. The Conference which led up to it had been called in order to prevent a fresh competition in post-War fleets, and the Treaty fixes the total tonnage in various classes for each nation, with the maximum tonnage and calibre of gun of individual ships in each class. As regards future capital ships the standard displacement must not exceed 35,000 tons, and the ship must not carry a gun with a calibre in excess of 16 inches. It will be observed that these limitations are such that the most modern battleships of Great Britain, America, and Japan which were in existence at the date of the Treaty fell within them, but that ships similar to Hood



[*Photo by Stephen Cribb, Southsea.*

H.M. CRUISER DORSETSHIRE, 10,000 TONS.

Commissioned at Portsmouth, September 16, 1930.

(*Engined by Cammell, Laird and Co., Ltd., Birkenhead.*)

must be allowed for it. Before any limitation of displacement existed, such considerations brought about an increase of 40 per cent. of the standard displacement of the Queen Elizabeth to arrive at the standard displacement of the Hood, in order to obtain an increase of 7 knots in the speed. Both ships carrying the same main armament and having approximately the same thickness of armour on sides, barbettes, and decks ; about one-half of this great increase of displacement was necessary on account of the much larger hull.

With a fixed standard displacement, and a marked increase of speed over contemporary battleships, the weight of the structure and machinery will be such that both the offensive power of the ship and the protection must be substantially reduced, so as to impair greatly the fighting efficiency of the ship for use with the Fleet ; it would appear to be doubtful if any nation will in future sacrifice any part of its capital ship tonnage in order to build battle-cruisers of a size approaching the limit fixed for individual capital ships. It might, however, happen that a class of battle-cruiser carrying guns intermediate between the 16-inch of the capital ship and the 8-inch of the cruiser, may under some circumstances be found desirable, the displacement being fixed appreciably below 35,000 tons.

With the displacement of new capital ships practically standardised at 35,000 tons the number of units in each fleet is limited ; further, as post-War capital ships each cost about seven million pounds, the replacement of ships which are obsolete or which have reached their age limit becomes a most expensive matter. The important question of replacement was discussed by the delegates of the five Powers concerned in the Washington Treaty when they assembled in London and drew up the International Treaty for the Limitation and Reduction of Naval Armaments in April, 1930. By this new Treaty the Powers, as far as capital ships are concerned, agreed not to exercise their right to lay down the keels of replacement tonnage during the years 1931–36. At a previous conference at Geneva in 1927 an attempt had been made to bring about a reduction in the maximum standard displacement and in the calibre of guns for future capital ships, but agreement could not be reached, nor was anything done in this connection at the London Conference. The financial advantage that would be obtained if such reduction was made in each replacement is, however, substantial, and as the next largest fighting ship now allowed is the 10,000-ton cruiser, some reduction in size and gun power will probably ultimately be accepted. If the calibre were reduced to 14 inches, it would be possible to prepare a satisfactory design in which the same number of guns and speed of ship would be retained, and in which the standard displacement might be kept some five or six thousand tons less than the present limit ; while if the 12-inch gun were reverted to the possible reduction might be expected to become much greater.*

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* "The British Admiralty have informed the Government that it would favour a reduction in size from 35,000 tons to 25,000 tons, and of guns from 16-inch to 12-inch, together with a lengthening of the age from twenty to twenty-six years."—Memorandum on the London Naval Conference, Cmd. 3485, Feb. 4, 1930.

The light cruisers which took part in the War were mostly 6-inch gun ships of displacement four to five thousand tons, designed for speeds ranging up to 29 knots. In 1915, however, a type of fast ocean cruiser—the "Raleigh" Class—was evolved to deal with enemy raiders; the displacement became 9,750 tons, speed 30 knots, and a main armament of seven 7·5-inch guns was provided. These were followed by British and American vessels of about 7,500 tons laid down towards the end of the War, and by ships of similar type laid down just before the date of the Washington Treaty by Japan and France. In 1923, when the Washington Treaty came into force, the latest types of light cruisers built and building were :—

Nation.	Class.	Year laid down.	Length.	Displacement.	Speed.	Main Armament.
Great Britain	Raleigh	1915	605	9,750	30	7—7·5-inch
	Emerald	1918	570	7,550	33	7—6-inch
America . .	Omaha	1917	535	7,500	33½	12—6-inch
Japan . .	Furataka	1922	595	7,500	33	6—8-inch
France . .	Duguay-Trouin	1922	595	7,250	34	8—6·1-inch

The British cruisers in the above table were designed with a view of engaging lightly armed and unprotected vessels, and were only provided with the same degree of protection as had been fitted in previous classes of 6-inch cruisers. The protective plating on the sides has a maximum thickness of 3 inches, with a deck of about 1 inch; this had been found effective under War conditions against the 4- and 5-inch gun and gave a fair degree of protection against the 6-inch gun at cruiser ranges. In the American and Japanese vessels in the above list about the same amount of protection was provided in the design.

The Articles of the Washington Treaty, relevant to cruisers, state that no vessel of war exceeding 10,000 tons standard displacement, other than a capital ship or aircraft-carrier, shall be built, and that no vessel of war hereafter laid down other than a capital ship shall carry a gun with a calibre in excess of 8 inches. It will be noticed that, as in the case of capital ships, the limits fixed for future building are such that they prevent cruisers being built in future larger or more powerfully armed than existing ships.

Since the date of the Treaty, the five contracting Powers have each designed and built cruisers up to the limit of displacement and calibre of gun allowed, the arrangement of main armament most favoured being that where the guns are placed in four twin turrets on the middle line of the ship. The Japanese, however, have fitted five such turrets, and in America nine guns in three triple turrets has been adopted for later designs. A speed of not less than 32 knots has been universally adopted. The type is larger, faster, and more powerfully armed than any latter-day cruisers not provided with armour and, being based on the vessels shown in the table above, they have an armament of excessive strength combined with great speed and a large radius of action.

These qualities would enable them, on the outbreak of war in distant waters, to work on the enemy's lines of communication and trade without waiting for the support of the main fleet and without any great risk of being brought to action by superior enemy forces. As a consequence every nation interested in trade at sea had to take the new ship into account. They have so become the recognised standard for cruiser power, and since as soon as any of the contracting Powers started building up to the limit the others were driven to follow, the maximum limit fixed for the tonnage and gun power of cruisers by the Washington Treaty has become the minimum also, and a great advance in the size and cost of cruiser units has followed the Treaty.

Although in the earliest ships started by the several nations variations occur in the dimensions, speed, and amount of oil fuel carried, later ships tend to become more nearly alike. These have speeds of 32 to 33 knots in the standard condition, and have a radius of action of about ten to twelve thousand miles at the cruising speed, necessitating the stowage of over two thousand tons of oil. To obtain the desired speed a length of about 620 feet is called for and a machinery installation of 80,000 to 100,000 s.h.p. To find space for this machinery and fuel and to provide accommodation for a complement of some six hundred and fifty men a roomy hull is necessary. A very considerable amount of space and weight has to be allocated to the turrets, magazines, and shell rooms for the main guns, and the modern equipment of torpedoes, anti-aircraft guns, catapults, and seaplanes. When all other requirements are met it will be found that there is very little margin left in the total 10,000 tons to provide protection to the vital parts of the ship, and that very little more than a thousand tons remain for protective purposes, even in the designs where the best possible protection is desired. When this weight is spread over the extensive areas that require protection the resulting thicknesses are very small, and in general the 10,000-ton Treaty cruisers that have been completed have side and deck protection no better than that which was provided in the smaller cruisers of the War period.

The great weakness of the type is the insufficiency of the protection that can be afforded, particularly on the sides and above water decks amidships, where the deck immediately over the machinery spaces is usually at a height slightly above the waterline owing to the comparatively shallow draught of the vessels; all the while such high speeds and great endurances are held to be essential the ship must be of such size that she cannot be adequately protected against a ship with gun power equal to her own; as at present built a well-placed salvo of 8-inch shells would place the ship receiving it out of action, and it would have required at least an additional thousand tons of displacement beyond the Treaty limit if full protection against 8-inch guns had been incorporated in the design of existing ships. It is possible that experience will show that some reduction in the designed speed and in the radius of action is acceptable; the reduction of space required for machinery and fuel would permit of reduced dimensions for the ship, there would be a saving of weight in hull, and a reduction in the areas requiring protection. The present speed is only obtained at great expense, both first cost and maintenance, which would be materially reduced by the acceptance of a speed 2 or 3 knots below that at present provided; one of the latest foreign cruisers obtained on her trials recently a speed of 32¾ knots, the s.h.p. developed being nearly 110,000. She obtained 30 knots for 61,000 s.h.p., and each knot above thirty required approximately an additional 15,000 s.h.p. For each of these knots she was using as much power as would drive her at a speed of 20 knots.

Large building programmes for the construction of these 10,000-ton cruisers were in contemplation in 1927, and the competition in capital ship building which was ended by the Washington Treaty appeared to be starting in the 10,000-ton cruiser class, when the question as to whether these ships were essential for all cruiser services received particular attention. It was recognised that although the ships are well suited to act as raiders or for clearing smaller enemy raiders off the seas, they are not so well suited for the special needs of the nations which, beside the work with the fleet, also require the convoy of merchant ships in war or undertake police work on the seas during peace, which work could be at least equally well performed by smaller vessels. It thus became a matter for consideration whether certain of the 10,000-ton cruisers authorised by the British and American Governments could not be advantageously dropped and equivalent cruiser power obtained by building other ships of less displacement and less powerfully armed. This question ultimately formed part of the matter debated at the Geneva Conference on the Limitation of Naval Armaments in 1927, a 6-inch gun ship somewhat similar to the Emerald and Omaha being visualised in the British proposals.

No agreement was reached at the Geneva Conference, but in 1929 the five Powers " desiring to prevent the dangers and reduce the burdens inherent in competitive armaments, and desiring to carry forward the work begun at the Washington Naval Conference, and to facilitate the progressive realisation of general limitation and reduction of naval armaments " appointed representatives who met in London and in April, 1930, concluded an International Treaty for the limitation and reduction of naval armaments. In the Treaty the 5—5—3 ratio of strength between Britain, America, and Japan for capital ships, agreed to at Washington, was extended to cruiser strength, and in order to meet national requirements as to the type of cruiser best suited to the needs of the several nations, cruisers were divided into two categories: (*a*) with guns of more than 6·1 inches calibre, (*b*) with guns of 6·1 inches calibre or less. In class (*a*) the maximum number of ships allowed is for America eighteen, Great Britain fifteen, and Japan twelve; the total aggregate tonnage of the cruisers of each fleet on December 31, 1936, under each of the categories is also fixed by the Treaty, Great Britain being allowed 48,700 tons more than America under (*b*) to compensate for America's excess of 33,200 tons under (*a*).

Following the Treaty of London, new vessels carrying the armament allowed for class (*b*) will form an important part of future building programmes. Since the War several modern cruisers of smaller dimensions and cost than the 10,000-ton ships have been started, of which the following are examples :—

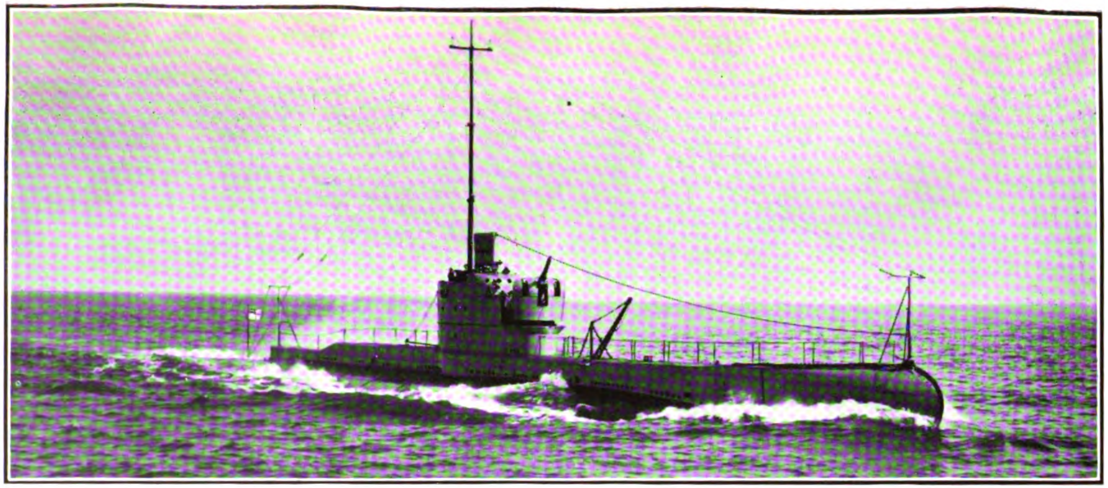
Nation.	Class.	Year laid down.	Length.	Displacement.	Speed.	Main Armament.
Japan . .	Sendai	1922	535	5,600	33	7—5·5-inch
Germany .	Leipzig	1925	544	5,900	32	9—5·9-inch
Argentine .	Almirante Brown	1927	544	6,500	32	6—7·5-inch
Italy . . .	Condottieri . .	1927	559	4,900	37	8—6-inch

A small amount of protective plating is carried by these ships on the sides and decks over machinery and magazines, but it is not sufficient to make them safe against guns of the same calibre as their own main armament.

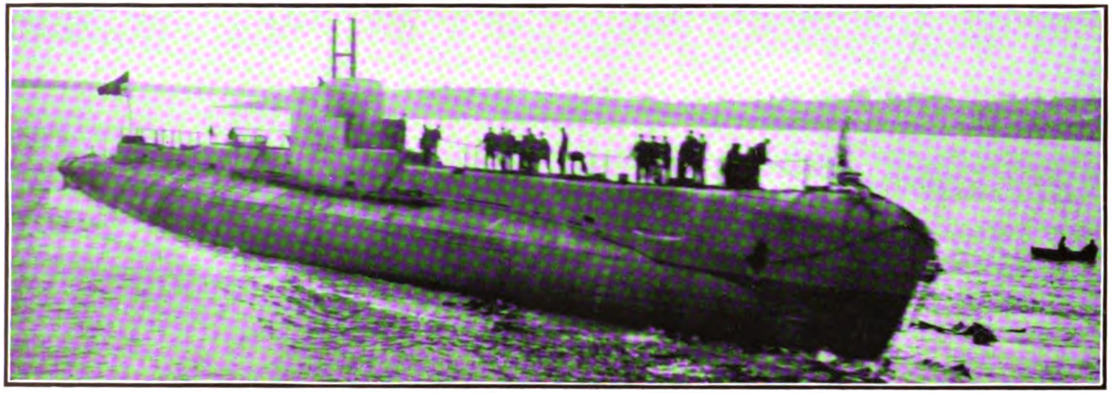
The "Condottieri" class are remarkable for the high speed adopted for the design, which has been obtained on trials ; the s.h.p. required for this speed is equal to that provided in many 10,000-ton cruisers. To keep within the displacement light machinery of the type generally adopted in destroyer leaders is essential, while a lightly built hull with little protection is necessary. The design accordingly resembles that of a powerfully armed destroyer leader, and although the ships are probably well fitted for service against destroyer craft or in close waters near a base, they would not be so well suited for ordinary cruiser work with the fleet or on the high seas. The three other ships in the table would appear more nearly to represent the type of vessel that will be favoured for the cruisers of category (*b*).

To enable a speed of 32 knots to be obtained the S.H.P. of the machinery must be high. As in the case of the larger cruisers the acceptance of a maximum speed only 2 knots lower would result in a material reduction of the power and weight of the machinery, leading to economy both in first cost and in the working of the ship. Some at least of the new ships will be required for duties where excessive speeds would not be necessary, and the fixing of the speed to be provided in their new vessels in order to meet the varied requirements of the several nations will be a matter for very careful consideration by the naval staffs concerned. As regards armament, the disposition of the 6-inch guns will probably be much the same as that adopted for the 8-inch guns of the larger vessels, viz. three or four turrets with triple or twin guns, while if a somewhat lower speed than that of the 10,000-ton cruisers be accepted, the vessel could be adequately protected against the 6-inch gun without unduly increasing her displacement. The standard displacement of vessels of satisfactory design will, it is anticipated, range from 6,500 to 7,500 tons, and they will probably be completed at a cost of from three-quarters to half-a-million pounds less than the present-day price of a 10,000-ton cruiser with 8-inch guns.

WILLIAM J. BERRY.



H.M. SUBMARINE PERSEUS, 1,475 TONS.
Commissioned at Barrow, March 8, 1930.



H.M. SUBMARINE REGULUS, 1,475 TONS.
Commissioned at Barrow, November 1, 1930.
(By courtesy of the builders, Vickers-Armstrongs, Ltd.)

CHAPTER VIII.

THE MEANING OF A ONE-POWER STANDARD.

IF anybody studied the leading articles and pamphlets upon naval affairs which were published during the early and mid-Victorian age, he would probably study them for their subject-matter rather than for the form and style, and would think it natural that such phrases as "naval security," "one-" or "two-power standard" should have been used then as freely as they are now.

In a sense, it is natural; these phrases are the copper coinage of naval literature, and it is notorious that pennies remain the same after gold has been replaced by paper. But the permanence of these useful phrases, though natural, is most deceptive; their meaning has changed, but they are still used in the old manner. When Mr. Churchill discussed the recent naval treaty, he frequently used the words "one-power standard" as though they meant a numerical equality in British and American battleships and cruisers; when the battleship reductions provided for by the treaty were examined in the Press the phrase was freely used and always in the same sense. I propose to show that, in so far as the meaning of the phrase has entirely changed, to use it in the old manner is to do little more than to deflect the public's attention from a great national concern to a comparatively trivial one.

It is more than likely that a historian or a keeper of ancient records would find the words "one-power standard" in very old documents; it is certain, however, that they were first generally used during the Victorian age. A brief examination of Great Britain's position in Europe, and the use and purpose of her naval forces, between 1870 and the close of the century is, therefore, a necessary preliminary to any analysis of the phrase or of its meaning.

Political rivalry between Great Britain on the one hand, France and Russia on the other, was then a fact admitted by every diplomat and publicist in Europe. The political history of the day was a succession of controversies about colonial expansion, about the buffer states on the Indian frontier, about the partition of China into spheres of influence, or about the maintenance or suppression of the Turkish Empire; and nobody could be certain that these controversies would always be settled peacefully. What, then, was the greatest possible danger to Great Britain if one of these disputes ended in war?

The position had not changed greatly since the late eighteenth century; the country was still surrounded by continental states with very large armies, and those armies were very mobile, and capable of operating at great distances from their bases of supply. In 1877, for instance, large Russian armies operated in Turkey, many hundreds of miles from the Russian depôts, with rudimentary railway communications in the rear; and although the Russian soldiers suffered the privations inherent in war and died in great numbers from exposure and disease, the Russian armies never ceased to operate vigorously and effectively, and were never brought to a standstill by munition shortages or by a failure of essential supplies. It was clear, therefore, that invasion was the greatest danger to which Great Britain was exposed. If one of these great continental armies could be landed on British soil, we should have but few forces to oppose them, and long before the national resistance could be organised, the invaders would have reached the capital, and the entire country would be at their mercy. French and Russian statesmen, soldiers, and seamen were therefore confronted with the same problem that had confronted Napoleon; British statesmen with the same problem that had confronted Pitt, Canning, and Castlereagh. And just as the problem was identical, so its method of solution was identical, for it was virtually certain, as it had been for over a hundred years, that no invasion on a large scale could be undertaken, far less executed, unless the British battle-fleet were defeated. Then and not before, 300,000 Russians could be landed on the coast of Yorkshire, and as many Frenchmen on the coast of Sussex. When they were landed Great Britain would have to accept the very hardest conditions of peace, *sicut victores victis imponere consuescunt;* Great Britain's predominance in Europe would be a thing of the past; her colonial empire an estate awaiting division between the conquerors.

In those days it was generally declared, when naval estimates were discussed in the Press or in Parliament, that the British Fleet would be maintained at a two-power standard, and the phrase was often explained and in great detail. A two-power standard was stated to be a naval force capable of defeating, in battle, the strongest naval coalition that could be formed against us in Europe. This was a polite way of saying that if the French and Russian governments combined against us, we should maintain a Channel Fleet so powerful that it would defeat the French, and a North Sea force strong enough to shatter the Russians. And in so much as a hypothetical battle or battles was the purpose for which this fleet was maintained, it was tolerably easy to decide whether a one- or a two-power standard was being maintained, for comparative tables of the battleships and guns under the British, French, and Russian flags were always an adequate guide. If the British total of first-class ships was substantially larger than those of our rivals, it was reasonably certain that the battle at sea, upon which everything would depend, would end in our favour.

From all this it is clear that when the words began to be generally used, a one- or a two-power standard was simply the naval force necessary for combatting and overcoming the greatest foreseeable peril to the country. The peril was so well known that every thinking man was conscious of it, and the calculations by which this naval force was assessed were more or less trivial consequences of the national danger. And it follows that if the danger is the same, the method of calculation is still good ; but that, if it has changed, a new method of calculation is urgently called for. Can we therefore say that invasion is still the greatest maritime danger to which the country could be exposed ?

There is little doubt that the consequences of a successful invasion to-day would be even more terrible than they would have been a hundred years ago. Ships and supplies would avoid the harbours of the invaded country and famine would stalk after the invader ; indeed, it would be so universal, and its operation would be so rapid, that it might well involve victor and vanquished in a common catastrophe. It is not, however, with the effects but with the bare possibility of invasion that we are here concerned, and if the composition of a modern army is even briefly investigated, the result proves that there is room for doubt.

The first wave of a force invading a great industrial state could hardly be less numerous than 200,000 ; and this force, which would have to secure points of entry and seize positions preparatory to a general advance, would be followed by another at least twice as strong. The original force would therefore be one of about ten divisions with its attendant artillery and stores. What stores and supplies would be necessary for an army of this size ? The figures are rather surprising ; for a force of the kind carries with it about 85,000 tons of fuel and forage, 8,000 tons of petrol, and at least 8,000 tons of ammunition ; if it is accompanied by tanks the figures are very much heavier. But these impedimenta barely deserve the name when compared with what follows them, for an army of ten divisions may reasonably be expected to require from five to six thousand four-wheeled and two-wheeled vehicles, 3,000 lorries, besides an enormous number of miscellaneous instruments of transport, all more or less heavy and cumbersome. These figures are moreover only illustrative of the material which accompanies an army, they are merely its stock-in-trade of tools and implements, without which it can neither march nor fight. The volume of heavy stores necessary for maintaining it in the field is greater, for by the time ten British divisions were in Flanders ready to fight, 1,000 guns, 18,157 vehicles (exclusive of limbers), 4,600 lorries and motor ambulances, and about 120,000 tons of stores, exclusive of petrol, had been transported overseas. Even these figures do not adequately illustrate the labour and difficulty of maintaining an army in the field or the importance of its communications, for it must be remembered that a large army engaged in major operations will probably expend about three million shells in a month.

Here are facts which compel a reconsideration of the dangers to which we are exposed. In September, 1854, an army of 63,000 men landed in the Crimea, and the whole force was ready to engage any army that the Russians might oppose to them four days after the first soldier had been put ashore. It is doubtful whether a modern invading force would be ready to march and fight in as many weeks. The enormous mass of stores, vehicles, and baggage which I have only indicated without enumerating in detail, would have to be floated to an open beach on lighters and pontoons, removed from thence by pontoon cranes, hauled to the front on improvised track lines, and this immense operation of transport would be exposed to all the accidents and chances of the sea. When it is remembered that the figures I have reviewed refer only to an advanced invading force, and not to the main army which would be necessary to maintain the invasion, it will easily be understood that the danger of invasion must be very much diminished by the reluctance of continental generals to undertake such operations. Unless a fully equipped port could be seized and held within a few hours of the first landing, there could be only one result to this long and tedious operation. The invading force would be held, on a small front, with its flanks on the sea, and either defeated when the national resistance was organised, or besieged in its precarious holding of some fifteen miles of open beach and the line of hills above it. Everything seems to show that the leaders of great armies will nowadays be most reluctant to carry their forces away from a continental railway system, far less to trust a large force to a system of communications which begins in their own country, traverses the sea, and ends, not in a harbour with its equipment of wharves and cranes, docks, railway sidings, and rolling stock, but on a bare beach of sand and shingle, pounded by the waves of the open ocean.

But the consequences of these changing circumstances are even more important on the sea than on the land. First it was a cardinal point in all our plans of defence that the success or failure of an invasion would be decided by a battle between the battle squadrons of either side. In a sense this is still true, for if the principal maritime force of an invading party is defeated it is virtually certain that the invasion will come to nothing. Nevertheless there is a change and a very important one: whereas in the nineteenth century a defeat of the British battle fleet would inevitably have been followed by a large and probably by a successful invasion, this is no longer a necessary consequence. Neither the battle fleet of the invading nor the invaded side could remain at sea, and in one place, for more than a fraction of the time necessary for landing a modern army, and no matter whether the British fleet retired to harbour defeated or not, the vast collections of shipping off the place of landing could certainly be dealt with by minor attack. And it is very difficult to believe that persistent attack would be anything but successful. How could a small Liverpool, collected off Pevensey beach or Filey bay, maintain itself for months in such a position if all our submarine, destroyer, and cruiser forces were persistently attacking it, and the air force persistently bombing it? How could the tedious operations of landing immensely heavy stores on an open beach be executed in such conditions? Even if the operation were successfully performed on one or two days, how could it continue week after week and month after month? And it must be remembered that the safety of the whole invading force would be contingent upon this regular, methodical movement of heavy supplies. A very few breakdowns would be followed by the withdrawal or the surrender of the mass of the invading force.

Are we to conclude from all this that an invasion of Great Britain from the sea is impossible? By no means; nobody can estimate what difficulties may be overcome by the leaders of a nation at war. But in so far as it can be said with certainty that the difficulties of the operation have increased a hundredfold for the invader, that our means of defence have increased in proportion to the growth of the difficulties on the other side, there is, at least, a strong presumption that the danger of invasion is no longer the greatest maritime danger to which the country might be exposed.

If the invasion of Great Britain were still the only great operation of war by which the nation could be brought to terms and forced to the modern equivalent of surrender in the field, then we might presume that the staffs of continental armies were still labouring to overcome the difficulties, and were preparing and perfecting plans for landing and maintaining great masses of men upon British soil. For over two hundred years French statesmen, generals, and admirals worked unceasingly at the problem because there was no substitute. Experiment after experiment to find an equivalent for invasion was tried and failed, and every adversary was conscious of the stark, naked truth that if Great Britain was to be brought to terms, then invasion was the only way. Does that still hold good? The bare facts of the war at sea must be covered with a strange oblivion if we are to maintain that it does.

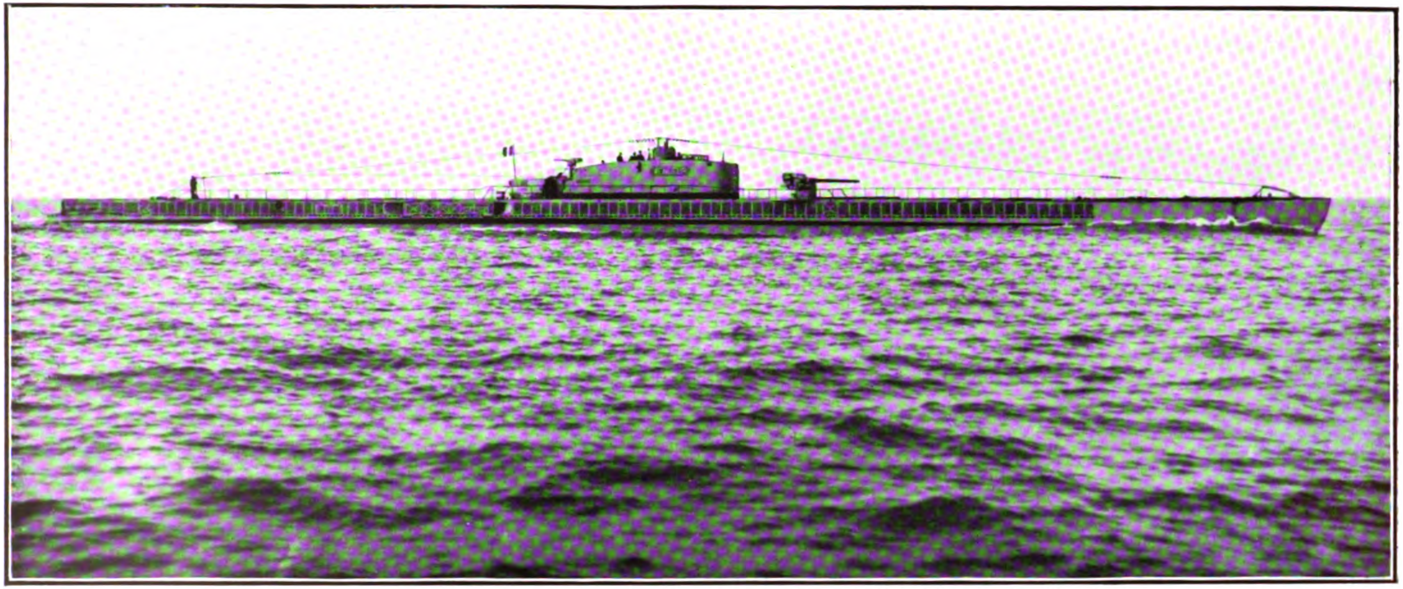
It is a singular misfortune for the nation that, whereas every great peril to the country has been averted by a resounding victory, which served as a memorial both to the danger and the deliverance from it, the submarine campaign—a menace far more formidable than Napoleon's invasion of Egypt, or his armada of lighters at Boulogne—has never been engraved upon the national memory. Yet that campaign was admitted by the highest naval authorities of the day to be a peril of the very first order. They admitted that unless it could be thwarted, the British Government would be compelled to come to terms, which, in the circumstances then obtaining, would have been the equivalent of accepting whatever terms our enemies chose to insist upon. Does not this admission, in itself, prove that an equivalent to the invasion of England has actually been found? And inasmuch as the admission has never been disguised or concealed, is it not plain common sense to assume the naval and military staffs of every European state are aware that modern commerce and industry have grafted an Achilles' heel to the body of the British Empire, and that, whatever may be the importance or unimportance of war upon commerce, war upon British commerce must henceforth rank as a major strategical operation, capable of yielding all the effects and consequences of an invasion, of a defeat of the British battle-fleet, or indeed, of any other major strategical operation? And if this be conceded, must it not be conceded, also, that a modern one-power standard is simply that standard of naval strength which secures us against a recurrence of the danger, and that to call numerical equality with the American battle-fleet a one-power standard is a pedantry, or a deliberate deception, about which it is difficult to speak with sufficient contempt ?

It will at once be answered, the experiment of submarine warfare upon commerce failed, in spite of its initial successes, and we have a safeguard against a repetition of the experiment more powerful than a Root resolution, or a Genevan codification of the laws of maritime war. That safeguard is the bare, plain fact that the United States will not tolerate indiscriminate war upon seaborne commerce. The naval and military staffs of the great European powers are probably keenly aware of Great Britain's Achilles' heel ; they must also be aware of the terrible consequences of making it a target for their javelins.

This objection contains a certain amount of truth but no more. It may be admitted that an American Government would combat unrestricted submarine warfare in 1950 as uncompromisingly as they did in 1917. That, however, does not constitute an adequate safeguard. There is another modified form of submarine warfare which the American Government have practically sanctioned. If anybody inspects the diplomatic records of the campaign, he will at once realise that if submarine warfare can be directed solely against the shipping of combatants, the American Government will raise no particular objection to it. This was precisely the form of war which the German naval staff had the folly to enlarge into that form of war which the United States would not tolerate. During the year 1916, a special form of submarine warfare was most successfully waged against British commerce, and the question at issue is whether that same form of war, renewed ten or fifteen years hence, with better means and opportunities, could become as destructive as unrestricted submarine warfare in the summer of 1917. If this is a possible or foreseeable danger, it at once gives us the new method of assessing a modern one-power standard, for, if anything can be certain, it is that the British Navy would have to combat the peril without American aid.

Here are the relevant facts. When practising that limited form of submarine warfare to which I refer, the Germans were able to destroy about 180,000 tons of British and about 170,000 tons of Allied and other shipping during the course of a month. This destruction was executed by a force of 42 submarines stationed in the North Sea, of 25 stationed in Flanders, of 20 in the Mediterranean, and of 10 in the Baltic. The real operating force was therefore 87 units strong, for the Baltic flotilla destroyed but little commerce.

Now it has to be admitted that, if this figure of 180,000 tons a month represented the greatest destruction that such a submarine force could possibly execute, the danger would not be of the first order. Unless every folly of the last war were repeated in the next, British and Dominion shipyards could build 2,200,000 tons of shipping in a year. But a brief investigation will show that, in slightly different circumstances, an equal force of submarines could be depended upon to do far more damage. The destructive efficiency of those German submarines which were operating against British



[*Photo by courtesy of the French Ministry of Marine.*

THE FRENCH SUBMARINE VENGEUR, 1,384 TONS.

Laid down, 1925 ; *completed* 1930.

commerce at the close of 1916, was proportionate to the total number of days spent at sea during the month; this total was somewhere between 750 and 800. But German experts have calculated that, of this total, about a quarter was wasted by the larger boats, and about an eighth by the smaller ones, during their unproductive cruises to and from their hunting grounds in the Channel and the western approaches. An equal force stationed along the edge of that same zone of water would thus operate for something like a thousand days in a month, and would certainly effect a much greater monthly destruction. Again, the total destructive capacity of the German force was proportionate to the total—not merely to the British—shipping they sank. The force whose operations I am now discussing, would, *ex hypothesi*, be attacking only British tonnage.

These facts and possibilities could, of course, be converted into figures, and an estimate made of the quantity of British shipping which this hypothetical force could count upon sinking; but this arithmetical method of assessing a national danger savours of pedantry. On such a subject as this figures are good for illustration, or for emphasis, but not for proof. The proper inference to be drawn from all these facts is, moreover, clear enough. If thirteen years ago a force of submarines which could only reach the western approaches after a four days' cruise, could sink 180,000 tons of British shipping a month, then ten years hence an equal force based on the edge of those approaches could sink very much more; and if due allowance is made for twenty years' progress in submarine mechanism and design this high total of destruction becomes higher still, and roughly approximates to the figures of shipping losses in the summer of 1917. The upshot of all this is, therefore, that submarine warfare waged according to rules and restrictions may quite easily be as formidable a menace to British security as that unrestricted submarine campaign which admittedly brought the country within measurable distance of the greatest calamity in British history, and that this is the danger by which a one-power standard should henceforth be calculated.

Can we make a reliable calculation in this new notation? It has to be admitted that the modern method of calculation is far more complicated than the old, which was a mere addition of foreign battleships and guns. Nevertheless, we know, roughly, both the numbers and the composition of the forces necessary for bringing the German submarine campaign to a standstill and this serves as a starting point. Those forces may be enumerated thus: (1) The cruisers and destroyers necessary for placing the entire Atlantic trade under convoy; (ii) the patrol forces necessary for watching and sweeping the approaches to all the fleet bases and commercial harbours; (iii) the forces necessary for mining and patrolling the Straits of Dover; (iv) the hunting flotillas in the Channel and the Irish Sea; and (v) the Grand Fleet, which served as a protective wall to the entire system of defence.

These forces were, however, necessary in the special circumstances which then held good, and the circumstances which I am now considering would alter the list very considerably. The last submarine campaign was waged by an enemy who could only reach the strategic area, where the war was to be lost or won, by encircling Scotland and Ireland, or by passing through the Straits of Dover: I am now considering an enemy that operates from harbours on the edge of that zone of water which is to Great Britain what Metz, Toul and Verdun are to France. Item number three on the old list is obviously unnecessary under the new hypothesis; but, on the other hand, item number two would probably be represented by larger forces. Again, item number five—the Grand Fleet—was unnaturally large owing to the exceptional size of the German Fleet; it is most unlikely that any continental power will ever again construct so large a battle-fleet as the Germans then possessed.

But if, under my present hypothesis, some items on the list are diminished, another—the most important of all—is very much expanded. Whatever else may be necessary or unnecessary for the protection of commerce, a comprehensive convoy system is the essential measure of defence; for it is the only known method of reducing losses to a bearable figure, and no mechanical invention, no progress in ship design, has prejudiced its efficacy. But the system is only an adequate protection against submarine attack; it positively exposes trade to heavy losses from surface attack when that is possible. The Atlantic convoy system, supplemented by local convoys in the North Sea and Channel, did certainly bring the German submarine campaign to nothing, but only because the enemy could not supplement their submarine campaign by cruiser attacks except upon one route—the Scandinavian. The case is entirely altered if the enemy is free to force trade to run in convoy by submarine attack, and then to attack the entire convoy system with small groups of fast and powerful cruisers; and this is the case which I am considering. The forces on item number one now become the forces absorbed by a convoy system, and those necessary for covering it against cruiser onslaughts. If anybody considers that, when the Atlantic trade is under convoy there are never less than fifteen, and often more than twenty, groups of ships in the Channel and western approaches, that the enemy can select any point of attack from the Straits of Dover to the twentieth meridian, that the attacking force could always be five cruisers of the latest and most powerful type, he will realise what very large forces would be necessary to cover a comprehensive system of convoy; and when making the calculation, he would do well to remember that, in October, 1917, the thirty light cruisers detailed to cover the Scandinavian convoy proved inadequate to the purpose.

To calculate an adequate one-power standard by this new method is not possible in an article of this compass; my intention is, moreover, to suggest a method proper to existing circumstances and not to attempt the calculation itself. If it is true that a one-power standard is the force necessary for thwarting the greatest foreseeable maritime danger, if that danger is a renewal of submarine warfare in circumstances far easier to our adversaries than those of which we have experience, I may claim to have proved my point. And without forestalling the results of a scientific calculation, I think it must be obvious to every person who has ever given any consideration to naval affairs that the British Fleet, as now limited by treaty, is well below that standard. If some high expert can show how, with the forces now available, he could establish a convoy system and then the forces necessary for covering it, maintain hunting and sweeping flotillas off the mouths of our great harbours, and concentrate a Grand Fleet strong enough to protect the entire system, his distribution list would be highly instructive. I, at all events, am so simple or so ill-instructed that I believe the task to be impossible, unless we are assisted by one of those Eastern magicians who raise armies by casting grains of rice upon the earth, and assemble great fleets by throwing chips of wood upon the water.

A. C. Bell,
Lieutenant-Commander, R.N.

CHAPTER IX.

THE NAVY MEDICAL SERVICE AS A PROFESSION.

"WHAT do you think of the Navy as a profession?" is a question on the lips of many anxious parents. Now that I am retired after thirty years' service as a doctor in the Navy, my position is such as to enable me to furnish what I believe to be a dispassionate and straightforward answer so far as the medical branch is concerned. Much naturally depends upon the nature and attributes of the individual concerning whom the question is propounded. The learned Dr. Johnson once remarked he could not understand why anybody went to sea as long as there was a gaol open! That type of modern young Æsculapius* who insists upon a financial return equivalent to what he knows to be his market value, and who is so essentially practical and far-seeing that he shies at adopting a career whose main inducement is unlimited opportunity for travel and adventure, is better out of the Navy than in it, for under existing conditions of pay and pension no Navy doctor can hope to earn an income commensurate with that of the civilian medical man of his own standing. Nevertheless, it is but natural that any young medico, before making his final choice, should carefully study the pay and prospects of all the avenues open to his profession—private and panel practice, Municipal, Prison, Colonial, Army, Navy and Air Force Services, and so forth.

He will find out that those who run a panel practice, after the first few years of work, may be earning at least £1,000 a year. Then he inquires into the prospects offered by the Navy, and as these are somewhat involved, owing to allowances, bonuses, etc., it will be well to give them in detail.

PAY AND PROSPECTS.

The young medico enters the Service as a Surgeon-Lieutenant on the Short Service List, and as such he must serve for three years with a possible extension of 12 months. His pay during that period is £450 3*s*. 4*d*. a year, with a gratuity on discharge of £8 6*s*. 8*d*. for each complete month of service. He receives an outfit allowance of £50 on joining, a fourth of which will have to be refunded to the Admiralty for every six months or part of six months of the two years he fails to complete. He is entitled to the same allowances as those granted to Permanent List officers with whom he ranks "with but after." If injured on duty he is treated, as regards gratuity or pension, under the same regulations applicable to permanent officers. Should his death be due to the Service, his widow and children would be dealt with in a similar manner to those of the Permanent List. Any time after the first six months he may transfer to the ranks of the permanent officers; he must then serve for two years afloat in order to qualify himself for promotion to the rank of Surgeon Lieutenant-Commander, which is attainable after six years' service, his sea-time as Temporary Surgeon being allowed to count. In his turn the Surgeon Lieutenant-Commander must serve two years in that rank afloat, or for four years in the present and past ranks combined, to qualify for promotion to Surgeon Commander, a rank he should attain after twelve years' service.

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* It is significant that Æsculapius, son of the great god Apollo, is the first recorded naval surgeon, he having been appointed to the ship Argo specially commissioned by Jason with his crew of Argonauts when he sailed to Colchis to recover the Golden Fleece.

There are 27 higher ranks (Captains and Admirals) all dependent upon selection by a special board, or, in the case of the Director-General, by the Lords of the Admiralty. The rank of Captain can be gained in 10 to 12 years; Rear-Admiral in another five years or so, and finally Vice-Admiral, which goes only with the office of Director-General, in about another four years. The present disposition of the Fleet is such that a large proportion of the appointments afloat are in foreign waters, but the Regulations do not require any strict proportion of foreign service in order to qualify for promotion. If, after a few years, the naval doctor finds his general environment uncongenial to his tastes, he can withdraw from the Service with one or other of the following nest-eggs: After four years' full-pay service, £500; after eight, £1,000; after twelve, £1,500; and after 16 years' service, £2,250. His rates of active and retired pay are at present 7 per cent. lower than the standard rate given below, a rate fixed when the cost of living was high:

RANK.	ACTIVE PAY.	RETIRED PAY.
Surgeon-Lieutenant	£450 to £493	£419
Surgeon-Lieutenant-Commander	£593 to £627	£419
Surgeon-Commander	£763 to £967	£558
Surgeon-Captain	£1,104 to £1,367	£837
Surgeon Rear-Admiral	£1,782	£940
Surgeon Vice-Admiral	£2,325	£1,112

The age per rank for compulsory retirement is: Lieutenant-Commander, 45; Commander, 50; Captain, 55; Rear-Admiral, 60; Vice-Admiral, on vacating office. Certain allowances—by no means exceptional, for one in four doctors draws one or other of them—make substantial increments to the pay. Rear-Admirals and Captains in charge of hospitals draw 10*s*. a day, and Commanders, 5*s*. Sixty specialist allowances of 5*s*. a day are available. Senior medical officers of flag-ships receive 5*s*. and 2*s*. 6*d*. a day flag allowance. For retired officers there are two Greenwich Hospital Pensions of £100 each a year for officers with or above the rank of Captain, and 11 of £50 a year for Commanders and lower ranks. Three Good Service Pensions of £100 per annum are given to officers of the higher ranks.

INCENTIVES TO HIGH-CLASS WORK.

Encouragement to medical officers to keep abreast of their ever-advancing profession is by no means lacking. Those who have held appointments at civil hospitals are *eligible* after qualifying to have their seniorities antedated up to a year, but decision to do this or not is entirely in the hands of the Director-General. Officers obtaining over 75 per cent. of marks at the examination for promotion to Surgeon-Commander are eligible for a year's advance of seniority; over 85 per cent. entitles them to 18 months' advance, while he who gains the highest aggregate marks for the promotion examination is awarded, in addition, the Gilbert Blane gold medal. Other distinctions open to naval doctors are the Chadwick Naval Prize, the North Persian Forces Memorial Medal, and the Parkes Memorial Prize. Finally, there is a limited number of special promotions to the ranks of Lieutenant-Commander and Commander for conspicuous professional merit or distinguished service.

At Haslar Hospital the newly-entered Surgeon-Lieutenant goes through a course of instruction in tropical diseases, naval hygiene, anti-gas, anti-mosquito, diving, naval custom and discipline, and the art of understanding and rendering the obscurities and complexities of the King's Regulations and Nosological Returns. Four-month courses in general and professional subjects are granted medical officers below the rank of Captain, after which they are appointed to one or other of the big naval hospitals. Three courses each of three to six months' duration are arranged at recognised civil teaching centres for officers selected for specialists' posts, and such officers, if the fates are propitious, will subsequently undergo courses of three months' duration in their special subjects every four years during their tenure of specialist employment. The subjects in which an officer may specialise cover a wide ground, from pure medicine and surgery to bacteriology and physical drill. A course for promotion to Surgeon-Commander is taken by officers of six to eight years' service, three months of which are spent at the London Hospital in medicine and surgery and two months at the Naval Medical School, Greenwich, in Hygiene, Pathology, Tropical Diseases and Microbiology. Such facilities for rubbing up one's work would turn a general practitioner green with envy, but, it has regretfully to be added, they are entirely contingent upon the "exigencies of the Service" clause, and just at present, owing to the very serious shortage of naval doctors, the clause is in an active and flourishing condition.

THE SHORTAGE OF NAVAL DOCTORS AND SOME OF THE CAUSES.

When I entered the Navy as one of 45 candidates who had sat to a stiff competitive examination for 17 vacancies in 1896, the Service was attracting some of the best types of men from the public schools and London hospitals. From about that time to the present the curve of popularity has steadily declined, and so much so that, in latter years, all competition for entry has ceased. The demand is exceeding the supply in an unpleasantly progressive manner. At the half-yearly entrance examination in 1901 seven men came forward in response to 14 vacancies advertised by the Admiralty, three were rejected as physically and professionally unfit, and four were entered; a month later a single surgeon was specially nominated. In January, 1902, nine surgeons were passed in to fill 18 vacancies, and in May only 10 came forward for 30 vacancies. In 1903 there were 486 medical officers in the Navy doing the work of 544, a deficit of 58. In 1905 not a single surgeon entered. In 1906 the doctors required were 593, the actual number was 515, a shortage of 78.

The deficit was not some evanescent depression affecting all branches alike, for in 1897 the ratio of executive Lieutenants to the total force was 12·6 per 1,000, in 1898 it was 15·9 per 1,000, and it went on steadily increasing until by 1911 it was 20·7 per 1,000. In 1860 there were 499 naval doctors, in 1901 there were 442 and in January, 1929, there were 300 permanent, and 90 short service, medical officers, or a total of 390 doctors. In January, 1930, the permanent doctors were 294, the short service 81—that is, a total in the Navy of 375 medical officers. Nor is there even need to analyse statistics and the depressing tale they tell; we can go straight to the oracle and hearken to the words of the First Lord in his speech on the Navy Estimates in the House on March 17 last. The seriousness of the shortage may be gathered when we read between the lines of his carefully-guarded official utterance:—

> "I regret that some concern is felt by my advisers over the difficulty of obtaining an adequate supply of medical officers, in spite, may I say, of very special efforts which have been made during the last twelve months by the Medical Director-General."

Then followed a naïve appeal to civilian doctors in the House to use their influence to persuade young doctors to enter the Service and so to "assist the Admiralty in this regard"! The very special efforts alluded to consisted, *inter alia*, in addresses to medical students of certain metropolitan hospitals portraying the allurements of a Navy medical career. But such special overtures will never meet with the desired-for response unless and until the knife is boldly seized and cuts the vicious circle in which the shortage due to unpopularity and the unpopularity due to shortage have for decades been running after each other's tails.

The many real grievances must be rectified; this once effected, capable doctors will flock in, and, moreover, will do so irrespective of rhetorical appeals on the part of Ministers or of any urge from leading lights of the medical profession, whether inside or outside the House of Commons. There is no doubt but that, as in other walks of life, pay could be augmented to the point where medical officers would reconcile themselves to any discomforts and slights; their loss on the swings being compensated for by their gains on the roundabouts. Cecil Rhodes was fond of saying: "Every man has his price," but as no Treasury is ever likely to foot a bill of a magnitude requisite to cover such conditions, common sense asks, why not eliminate some of the other factors that make for unpopularity?

It should, for example, be made possible for medical officers to be the final arbiters in their own province, which is by no means at present the case. True, it is only when some officer of a hectoring disposition is in command that unpleasantness ever occurs over differences of opinion on hygienic matters, still, the principle is there and it is a bad one.

Admittedly the over-subordination of the medical branch, extending as it does from top to bottom, is by no means as irritating nor as subversive of efficiency as it was in the past. In 1785 Lord Howe's fleet was decimated by scurvy and several ships were nearly lost through the disease. For fifty years the issue of lemon-juice had been urged by the naval medical authorities, and for fifty years the Admiralty stubbornly blocked the proposed measure.* Had the Director-General been in a position to enforce what he knew would check the disease, what an incalculable amount of suffering, death, and belligerent impotency might have been avoided! If there is any blot to-day on the naval escutcheon, it is that vexed question —Tuberculosis. Here are specially picked men, with an above-the-average physique when first launched on a career of an essentially open-air nature, who yet present a ratio of a disease that is non-hereditary but infectious, which every doctor in the Navy or out of it knows ought to be and could be very considerably lower.† In 1898 there were 222 cases of Tuberculosis with 29 deaths and 7,295 days' sickness lost to the State. Thirty years later, in 1928, the cases were 182, the deaths 20, and the lost working days through sickness amounted to 12,522. Even if the huge increase in the days' sickness can be explained in part by the more careful nursing, the earlier diagnosis, and the absence of that unseemly haste that in Victorian days amounted almost to a panic at once to invalid the cases and turn them loose amid the civil population,‡ can it be said that the figures given above represent an improvement at all commensurate with the improvements that have occurred—and which will be specified later—in practically every other category of disease? No.

Does the existence of an undue proportion of this disease constitute a reflection on naval doctors? Emphatically not, for, while they may *advise* in questions of ventilation, *they have no control.* Allow medical officers of the Navy who have specialised in public health to have a more active rôle during the construction of men-of-war as regards the installation of the ventilating system, and the medical officers afloat to have practical (not theoretical) control of the apparatus, and not only will there result a marked decrease in the incidence of the disease and its consequent expense, but also a saving to the State through fewer alterations having to be made after commissioning in the ventilating system, as is so often the case under present arrangements. To quote the organ of the British Medical Association :

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* Sir Richard Hawkyns saved his crew from scurvy while in the Azores in 1590 by the use of lemon juice; it was not until 1844 that the issue was sanctioned in the Navy!

† Civilian statistics of tuberculosis, however, are by no means as reliable as naval ones, because while *every* case of tuberculosis in the Navy is promptly recorded only a proportion of such cases in civil life is notified.

‡ The recent concession of the Treasury regarding attributability of tuberculosis in H.M. Navy has considerably improved the lot of the men invalided out with this disease.

> " When things go right the executive claim all the credit, when they go wrong the blame is laid on the medical department. A plan which leaves the care of the health of the Navy to the caprice of Naval Lords and Commanding Officers who know little and care less about hygiene stands self-condemned."

A Commander-in-Chief not so long ago inspected a certain Medical Establishment and, just as he was leaving, said to the senior medical officer, in full hearing of many subordinates : " You understand, you are not in command of this place, but only in charge. *I* am in command ! " Another instance may be given. A passenger boat not carrying a doctor put into an isolated foreign port where some men-of-war were anchored, and stated she had an Army officer very ill on board, feverish, and covered with an eruption. Two medical men from one of the vessels went on board and diagnosed smallpox. With the Commander's sanction—for the Captain was on leave—the senior medical officer on his own initiative removed the patient temporarily to the upper deck of his own ship, and then spent the whole night rigging up an empty house on shore as an isolation sick quarters. In twenty-four hours not only had the two vessels been disinfected, but the sick officer, a doctor, nurse, and a cook had been accommodated in the improvised sick quarters. Not another case occurred, and eventually the Army officer proceeded to his destination. The medical officer sent a report to the Admiralty, and in due course an official letter was received by the Commander-in-Chief, expressing their Lordships' satisfaction with the prompt manner in which the Captain of the ship had dealt with the case, and stating that his action had in all probability prevented spread of infection. The Captain was to be informed accordingly *and any others concerned.* Both Admiral and Captain were up country on leave when the incident occurred and knew nothing about it until their return !

Medical officers of the Navy, in virtue of their training in a learned profession are, or should be, thoughtful and of a studious disposition, a fact often overlooked by the authorities. It is not an altogether easy matter for men who have left behind them their light-hearted twenties, on the one hand to bear happily the rigid and often galling yoke of naval discipline, and on the other to put up with that undiluted hilarity and noise that is the natural, healthy and rightful accompaniment of youth, but which, however welcome to all on occasions, becomes annoying for those who have reached a more sedate age, when it partakes of the persistency of a recurring decimal.

It is such reasons as these—and I have touched on but a few out of many—that cause exceptionally brilliant medical men to leave the Navy at the first opportunity. The eminent London physician, Sir Andrew Clark; Sir Joseph Fayrer, world-famed for researches on snake-poisons; Sir Archibald Robinson, F.R.S.; Sir Joseph Hooker, the great botanist; Professor Huxley, the famous zoologist—all left the sea Service almost as soon as they entered it. "The Life and Letters of T. H. Huxley" throws a lurid light on the naval doctor's life. He wrote to his mother:

> "There's no being alone in a ship. Sailors are essentially gregarious animals, and don't at all understand the necessity under which many people labour—I among the rest—of having a little solitary converse with oneself occasionally. . . . To a landsman fresh from ordinary society and its peculiarly undemonstrative ways, there is something very wonderful about naval discipline. . . . It is made so *very* obvious. You not only feel the bit, but you see it; and your bridle is hung with bells to tell you of its presence. Your Captain . . . in relation to his officers . . . is a demigod, a Dalai Lama living in solitary state, sublime, unapproachable; and the radiation of his dignity stretches through all the other members of the nautical hierarchy; hence all sorts of petty intrigues, disputes, grumblings, and jealousies."

There is something whimsical in the young scientist's complaint that not infrequently his laborious dissections of some rare marine specimen were chucked overboard as a "mess," and that his dredge astern was hauled in with suspicious frequency on the plea that it impeded the way of the ship. Hence the following:

> "The singular disrespect with which the majority of naval officers regard everything that lies beyond the sphere of routine tends to produce a tone of feeling very unfavourable to scientific exertions. How can it be otherwise, in fact, with men who, from the age of thirteen, meet with no influence but that which teaches them that the Queen's Regulations and Instructions are the law and the prophets, and something more?"

Such are some of the conditions that must either be mitigated or compensated for if the best type of medical men are to be forthcoming for the Fellowship of Naval Officers. If you do not get the best type you must obviously get a mediocre or inferior type, unless, indeed, as has already happened, you get no type at all, any one of which eventualities must react on the whole Navy and on the nation itself. You cannot in fairness expect an A1 health bill in return for a C3 medical attention.

WHAT THE NAVY OWES TO NAVAL MEDICAL OFFICERS.

Many of our naval doctors are among the keenest and most capable in the whole medical profession. The greater part of their work is silent, unobtrusive, unseen by public eyes, beyond even the appreciative ken of the non-medical laity. A faint idea of the value of this work may be gleaned from the following figures, which I have selected from the two years 1898 and 1928 simply because the intervening period happens to correspond to my own experience of the Navy. The total strength for those two years was 82,830 and 90,820 respectively, figures sufficiently close to justify comparisons of actual numbers in lieu of ratios. In 1898 there were 153 cases of typhoid fever with 34 deaths; in 1928 there were 7 cases and 1 death. Fevers of the malarial type numbered 2,075 cases with 20 deaths in 1898 as contrasted with 477 cases without a death in 1928. Smallpox is reduced from 24 cases with 2 deaths to 3 cases and 1 death. In 1898 venereal disease affected 11,926 of the personnel with 6 fatal terminations; in 1928 the cases fell to 5,875, none of which died. Taking all the diseases and injuries affecting the Fleet, there were, in 1898, 75,052 cases, 407 deaths, with a loss of working days to the State of 1,159,478. In 1928 the cases had fallen to 40,505, the deaths to 202, and the days' sickness to 646,211. In 1928 the men invalided out of the Navy were 520 less than in 1898. It is when we contrast such items as alcoholism, venereal, and parasitic skin diseases, all in great measure a result of ignorance and dirty habits, that the most striking results present themselves. Taking these three avoidable ills, it is notable that whereas in 1898 there was a loss to the State due to them alone of 356,371 working days, this figure was reduced, in 1928, to 124,095, a saving of 232,276 days.

Such remarkable improvement is partly traceable to the fact that modern naval doctors are more skilled in their treatment, partly to the fact that for the last fifteen years or so they have been delivering special lectures on these subjects to the ships' companies. Nor is the beneficent work of the naval doctor confined solely to the active working men of the Navy; it is extended, on the one hand to pensioners, and, on the other, to the young growing boys of the several training establishments. Take the case of diphtheria, once such a thorn in the side of those who were responsible for the physical welfare of boys. At Greenwich Hospital School, where for years it had caused a four per cent. annual morbidity, it has practically ceased to appear, and the carrier rate has dropped ever since the School was actively immunised.

Enough has been said, though much more could be said, to prove that naval doctors are well worth their salt, and that any withholding of their just and proper proportion of what is due to them is not only a grave reflection on those responsible, but an extremely extravagant and wasteful policy. The fact that the Navy Medical Service is not as popular and attractive as it should be is no reflection on the medical branch as a whole, nor on its Director-General. Not only is the present Medical Director-General a man of very exceptional professional attainments, but he is in addition an all-round sportsman in the best sense of the word, and he has laboured as much as is humanly possible in the direction of furthering the interests of the branch of the Service of which he is the head. But his task is, by the very nature of the circumstances under which he is placed, a Sisyphean one.

SOME ATTRACTIVE FEATURES OF THE MEDICAL SERVICE OF THE NAVY.

If, after reading these lines the young doctor makes up his mind to go into the Navy, he will at any rate be comforted by the assurance that the majority of his colleagues are keen, up-to-date men full of resourcefulness. If he is willing to discount the undoubted grievances that still exist and tread the somewhat thorny and devious path of naval life rather than the smooth, straight road trodden by his civilian comrades, he will never have to complain that his existence is either humdrum or lonely, and his outlook on life generally will be a far more comprehensive one than had he spent his active years in some particular corner of the British Isles. Travel is immeasurably the finest and pleasantest schoolmaster we possess, a schoolmaster who moulds the best citizens and truest patriots, by which often misinterpreted word I mean, not the objectionable shallow type of hurrahing, flag-waving individual, but the thoughtful, broadminded type who really has the welfare of his fellow-countrymen and the Empire at heart. It is in opportunities for travel that the Navy offers first-rate advantages, not only for seeing the world *via* the beaten tracks followed by civilian globe-trotters, but for penetrating into little-known countries, passing up great foreign rivers and calling at the many tropical islands scattered about the oceans of the earth. Everywhere is the naval officer accorded a hearty welcome, nowhere is the King's uniform more respected and beloved than in the far-flung corners of the Empire. He is made an honorary member of the local club, is asked out to dinners, dances, and tennis-parties; cricket, football matches, and shooting trips are arranged for his benefit. The more out of the way is the port visited, the more do the local residents vie with one another in hospitality. More than once have I enjoyed a fortnight's big-game shooting at the sole cost of paying bearers; trips that, from the expense point of view alone, would have been utterly out of the question had I been a civilian.

As already stated everything depends on the mentality of the person concerned, and whether such would lead him to give priority to the possibility of a fat income and living in a comfortable home, or to the certainty of learning something about the planet on which he dwells, spiced with a plentiful admixture of adventure and enjoyment. When I see the general practitioner going his humdrum rounds in a softly-purring car and the panel doctor receiving his routine visits of patients, I feel fairly confident that, even possessed of my present knowledge of all the discomforts, rebuffs, petty annoyances amounting not unoccasionally to injustices, I would still, if back in my twenties, choose a naval career. To be a famous specialist in medicine or surgery, to be a great scientist in some cognate branch of the healing art, falls to the lot of so few that any comparison of a naval doctor's life with that of such "star turns" is not justified by the law of averages. With these exceptions, the naval doctor, when later years find him with four anchors cast out of the stern and as many more out of the fore-ship, securely and happily tied up in that port to which he has been so long looking forward, and which he will the more enjoy after all his roving, will at any rate have a fund of experiences from which to draw the happiest recollections. Sometimes, of a winter's evening, as I gaze into the red-hot coals, my mind wanders over incidents of the past, including the comedies and tragedies of three wars, and, to quote that old reprobate, Blasphemous Bill:

> "I smoke my pipe and I meditate, in the light of the Midnight Sun,
> And sometimes I wonder if they *was* the awful things I done."

Once again I see a wounded rhinoceros galloping madly towards a khaki-clad young man and his gunbearer. There is a flash and report, and the huge brute comes tumbling to the ground with a second bullet through him . . . now the young man is returning to camp alone, but for a boy some way behind carrying his rifle, when four lions start up in the long grass and confront him . . . now on the Maputa river his boat is capsized in the dark, and I see him swimming frantically across the crocodile-infested river to gain the safety of the bank. . . . Once more I see an upset boat, to which two officers are clinging. It is dark, the inverted boat strikes a pile, snaps and sinks. The cries of distress of the drowning ones are heard by the harbour police, and eventually they are picked up more dead than alive. . . I follow him into Cambodia, he is watching the aged sacred white elephant slowly dying . . . now he is seated in a group with the dusky king before an arena, in which the hundred young wives of the potentate are singing and dancing to mouth-organs and tom-toms. I see him some days later amid the ruins of the buried cities of Angkhor. . . . Now he is back in civilisation, reading a paper at the Public Health Congress in Berlin, or he is in Washington representing the Navy and Army Medical Services at an International Congress.

Such are a few of countless incidents that come crowding into my mind as I look back along the vista of years, and which are mentioned in no spirit of egotism, for every retired naval officer could summon forth similar ones, but solely to indicate some of the differentiating features of a naval doctor's life. Youth is a period of anticipation and preparation ; action and realisation are the prerogatives of maturity ; meditation and retrospection are the pleasures of later years. I look back and recollect only the happy days spent with the jolliest, best, and most warm-hearted of companions. I feel the warmth of the tropical sun and inhale the spicy scents of the East. I hear the shrilling of the cicadas and the piping of bull-frogs, the monotonous chantings of the Chinese coolies, and once more I see the snow-crowned heads of Fuji, Teneriffe, and Kilimanjaro, the silvery sands of the Seychelles, the graceful palm-trees of Zanzibar and the white sails of the outrigged dugouts as they race across the sapphire bay of Ceylon. I am proud and happy to have been a Naval doctor.

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CHAPTER X.

MODERN DEVELOPMENTS IN SPECIAL STEELS.

THE purpose of the present article is to give some account, necessarily brief, of the part played by the metallurgist, in the development of marine engineering and construction.

In the early days of steam propulsion, metallurgical science provided the means for its proper development in the timely discovery of the Bessemer and Open Hearth processes of producing steel in the large quantities necessary. Progress in metallurgy has kept pace with the demand of the marine engineer, and has provided improved and new steels to enable him to go forward with confidence. The properties of many of the types of steel in general use to-day were unsuspected by early manufacturers, not only in respect of mechanical strength, but in the many diverse physical characteristics of which the engineer has made full use, and so achieved performances otherwise impossible.

The advantages which marine engineering has derived from metallurgical progress it mostly shares in common with the engineering industry as a whole. However specialised a branch of the industry may be, it is seldom that benefits it derives from the use of alloy steel do not find their application, perhaps in a modified way, in similar problems of other branches of the industry, and *vice versa*. The story of metallurgical progress is therefore best told with the whole engineering industry in view. Such advances, for example, as have taken place in tool steels, are of quite general benefit, machine tools being necessary appliances in all branches. It is interesting to mention that the latest modern Tool Steels contain additions to the Iron, of no fewer than eight other elements—Carbon, Manganese, Chromium, Nickel, Tungsten, Cobalt, Vanadium, and Molybdenum. The comparatively recent development of heat-resisting steels also is one which finds application wherever furnaces or heat are employed. This may be either for chemical reduction processes, heat treatment of steel, boiler furnaces for steam raising, or the internal combustion engine.

Then again, the electrical industry to which metallurgical progress has been of such special importance, although forming a branch of its own, has a large sphere of usefulness within other industries, and in ship construction much of the auxiliary equipment is nowadays electrical in character.

An attempt is made in the ensuing paragraphs to show, by specific reference to examples in ships and their propelling machinery, some of the benefits which are being derived by marine engineers from the use of alloy steels.

STRUCTURAL MATERIALS.

High Tensile Ship Plates.—Of the structural materials employed by the shipbuilder, that for ship plates is of front rank importance. For these, mild steel of approved quality is still the general rule. For the more special constructions, however, particularly with the advent of long vessels and high speeds, the comparatively low strength of Wrought Iron and Mild Steel imposed limitations. Steel of higher tenacity was called for, with which the necessary girder strength can be obtained without undue increase in weight.

The first alloy steel used in any quantity in this way, that is for shipbuilding, was Silicon Steel, the invention of the writer, following the beneficial effects which, as he had pointed out, and contrary to the ideas previously existing, silicon confers upon steel. Some of the first practical experiments in the use of silicon steel for ship plates were made by the late Mr. John Spencer who, using percentages of silicon between 0·70 and 1·00 in mild carbon steel, obtained the desired higher tenacity without any sacrifice in ductility. This pioneer work led eventually to the use of plates of silicon steel in the construction of both the Lusitania and the Mauretania, by which it was found possible to lighten considerably the upper deck structures—that is, to reduce the thickness of the scantlings—of these two vessels.

The use of silicon steel required special experience in its handling. This led, therefore, to the employment of other types of high tensile steel, that is, with a tenacity of 40 tons, which are being regularly employed in this country for certain types of ship plates. An excellent plate of similar tenacity has within recent years been produced from steel containing a relatively high percentage of manganese, up to about 1½ per cent., in otherwise unalloyed steel.

Steel Castings.—While endeavouring to confine the present article to metallurgical progress through the medium of alloy steels, it is not altogether possible to avoid reference to those benefits which have been brought about by the development of the manufacture of steel castings in the scientific and technical sense. In the early days of shipbuilding steel castings were unknown. Nowadays they form an essential feature, and in the largest ships are called for of enormous individual tonnage. It was largely due to the pioneer work from 1869 onwards of the writer's father, the late Mr. Robert Hadfield, in the face of much conservatism, that the manufacture of steel castings, and their application to industry on a practical scale, was brought about. With the steady increase in size called for by the industry, special technical difficulties in their production were met and have been overcome, often by the invention and provision of suitable plant. It is useful to record the success which has attended these efforts.

Armour.—In the construction of warships the question of protection is one of the greatest importance, and metallurgical science has been applied to a greater extent to this feature of the structure than probably to any other. The subject is one, however, which would require an article, or rather a book, to itself.

In light protective armour, of which much use is made in modern warship construction, an exceptionally high standard has been reached. The structures shown in Fig. 1 represent the Plotting House and Conning Tower (superimposed) constructed from plates 25 mm. in thickness, for each of two foreign warships.

The figure of merit in terms of De Marre coefficient, attained in firing tests by the test plates governing the contract for these structures, was as high as 1·34. A special feature of these plates, valued equally with their high resistance to penetration, is the immunity from detachment of fragments from the rear face as the result of impacts of the projectiles, thus avoiding the danger to personnel and instruments from flying fragments within the necessarily confined space.

An important advance has also been made in connection with bullet-proof plating, that is, plating intended for protection against machine guns and small arms. Hitherto such plating has acquired the necessary resistance to penetration by reason of its hardness. Hardness carries with it certain disadvantages both as regards behaviour when overmatched, and from the constructional point of view. These disadvantages have been overcome by the introduction by my firm of a new type of bullet-proof plating known as "Resista M.Q.," which is not only machinable in its bullet-proof condition, but can also be bent without injury to its protective value. Before its introduction machining and drilling operations had to be carried out in the manufacturers' works before the final hardening process. "Resista M.Q." plates can, if necessary, be drilled, and slots or holes cut as required, *in situ*, resulting in a perfect fitting to the structure. Instruments or other fittings can also be directly attached, or their position changed without difficulty. Structures can also be made with curved edges, thus in many cases simplifying construction and reducing the number of riveted joints and the added weight of structural material which they necessitate.

Another important application is the use of "Resista M.Q." plates for skin-plating of gunboats and fast light craft such as coastal motor boats. Hitherto the brittleness of the hard quality plates has precluded their use for this purpose on account of their liability to cracking under the local pressure or bumping alongside, and for other obvious reasons.

The superior behaviour under attack of "Resista M.Q." plating is well illustrated in Figs. 2 and 3. The ordinary hard type of plating shown in Fig. 3, although successfully resisting the bullet under the specified conditions, when attacked at velocities slightly in excess is completely perforated, with detachment of large discs of the plate material from the back. With "Resista M.Q." material, however, as shown in Fig. 2, complete perforation is only attained with velocities greatly in excess of that specified, and further, owing to its excellent toughness, no material is detached from the back of the plate. Thus, not only is greater protection offered against perforation, but, as in the case of the light armour previously referred

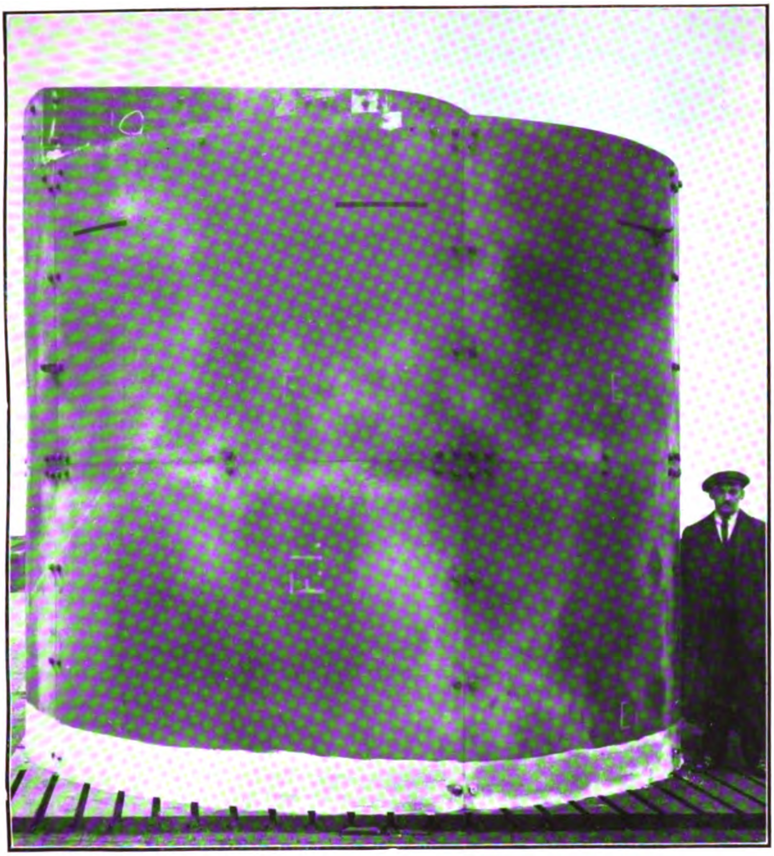
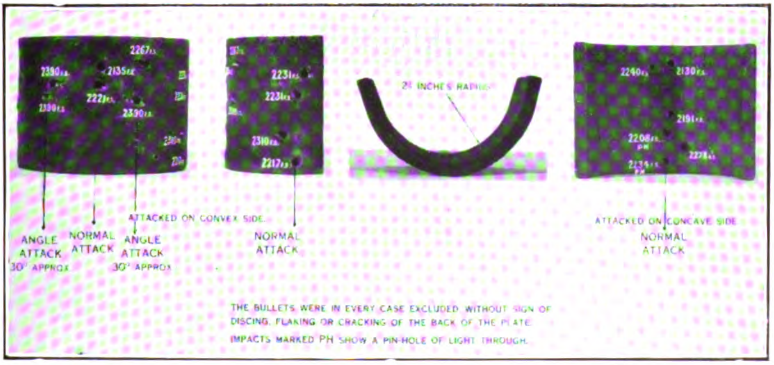


Fig. 1.—Conning Towers constructed from 1-inch Protective Plating of "Resista 61" Steel.

Erected prior to completion.



THE BULLETS WERE IN EVERY CASE EXCLUDED WITHOUT SIGN OF DISCING, FLAKING OR CRACKING OF THE BACK OF THE PLATE.
IMPACTS MARKED PH SHOW A PIN-HOLE OF LIGHT THROUGH.

Fig. 2.—Firing Tests with Armour-Piercing Bullets against Bullet-proof Plating of "Resista M.Q." Steel 0·5-inch in Thickness.

The bullets, some of which struck at velocities considerably in excess of the specification, were in every case excluded, without sign of discing, flaking, or cracking of the back of the plate.

Impacts marked PH show a pinhole of light through. The plate is not beaten, and considerable increase in velocity would be necessary to permit the passage of the bullet.

Prior to attack, and subsequent to final heat treatment, the plate has been bent to the radius shown.

to, there is no risk of injury to personnel or equipment from flying fragments from the plate.

Non-magnetic Plating.—The non-magnetic properties of certain types of alloy steel have also been of advantage, specially in the congested structures of warships, in which the action of the magnetic compass is seriously interfered with owing to the presence of large masses of steels close to the compass position. Compensation and adjustment of the instrument in such cases become difficult, and even then the directive action of the earth's field on the needles is very weak. The problem is accentuated where the offending parts are movable, for example, doors and scuttle covers. In these circumstances it has been found advantageous to utilise a non-magnetic steel. Thus while maintaining the structural strength this interference is completely removed. Manganese steel, which was invented by the writer of this article, and is non-magnetic among its many and useful peculiarities, has been utilised to a considerable extent in this way. This material was also found of great service during the War in the construction of a special type of mine, causing considerable disturbance to the enemy's fleet.

Fittings of Non-corrodible Metal.—Finally, in connection with the ship's structure, as distinct from the machinery, mention should be made of the increasing use of non-corrodible alloys, both ferrous and non-ferrous, for fittings of many kinds, much to the advantage of cleanliness and labour saving.

PROPELLING MACHINERY.

We are at the present time witnessing a keen rivalry between steam and the internal combustion engine as a means of propulsion. Which of these will ultimately prove victorious the writer is not sufficiently expert in such matters to attempt to forecast. Past experience in similar matters seems to indicate that each will find its own sphere of usefulness. However this may be the metallurgist is doing his best, in an impartial way, to assist the developments of both forms of prime mover, and with some success, as I hope to show by the following examples.

Steam Propulsion.—In steam engineering generally the striving after higher efficiencies is being maintained, and to this end not only do steam temperatures and pressures continue on the upward grade, but engineers are taking advantage of improved knowledge in fuel technology, for the working of boiler furnaces in an increasingly intensive way.

With the use of preheated air and increased rates of combustion, the temperature imposed on the material of the grates is reaching the limit which cast iron can sustain. Recourse has therefore become necessary to the comparatively new heat-resisting steels which are already of so much service in furnace work ashore, one of their characteristics being a high resistance to heat scaling. The Canadian Pacific Steamships, Limited, through the enterprise of their Chief Superintendent Engineer, Mr. J. Johnson, made the first application of mechanical stokers to cargo vessels, and have utilised castings in

" Era " heat-resisting steel for the various components of the grates, such as the tuyeres, grate plates, slicing bars, and extension plates. Fig. 4 shows one of the grates of the Erith-Roe type, of the S.S. Beaverford, after twelve months' continuous service, when the Inspecting Engineer reported it to be in perfect condition. Certain excrescences and irregularities appearing in the photograph are merely due to adhering clinker, resulting from the high furnace temperature, the incoming air being preheated to 310° F. With the component parts made from cast iron, replacement was necessary after every second round trip. Three of the company's vessels of the Beaver class have so far been fitted with grates of " Era H.R." steel in this way, with excellent results, and this practice will be continued.

In a test at 950° C. (1740° F.) carried out in an oil-fired industrial furnace, where mild steel wasted by scaling to a depth of 0·18 inch in 350 hours, the loss on the special steel used in these grates was only 0·00005 inch in 2000 hours, a fact which helps to explain its success.

Another application of heat-resisting steel in the marine boiler is for the supports of Superheaters. In this instance not only is its non-scaling character of value, but the other important characteristic of heat-resisting steels, namely, their remarkable strength at temperatures at and above a red heat, is called for, in order to maintain rigidity under the high furnace temperatures of advanced boiler practice. Such supports in " Era " heat-resisting steel are in use by the British Admiralty and Continental Navies in many vessels of their more recent construction with entire success.

The determination of the strength of steels at high temperatures necessitates a special testing technique. At ordinary temperatures the stress figure alone determines the amount of deformation which steel undergoes. Except under very refined measurement it does not matter how long the stress is applied. At temperatures above about 350° C. (660° F.), continuous " creep " with time will occur if the stress is high enough.

Thus the true criterion of strength becomes the stress below which no creep of practical importance takes place. For this purpose steels must be submitted to steady tensile loads over long periods, during which any tendency to elongation can be observed by delicate measuring appliances. A suitable apparatus as employed in the laboratories of Messrs. Hadfields, is shown in Fig. 5. " Creep " stresses thus determined seem to bear no relation to the tensile characteristics as ordinarily determined, even when the tensile test is carried out at the same temperature.

The establishment of an absolute limit of stress for a particular steel and temperature, below which no creep, however slight, takes place, is a matter for the present of extreme delicacy, and authorities in fact differ as to the possibility of there being such a limit. It is, however, possible to compare the strengths of steels on the basis of a fixed arbitrary but small rate of creep. In this way at 800° C. (1470° F.) the creep strength of " Era H.R. " Steel at 2½ tons per square inch compares with a figure of only ¼ ton per square inch for

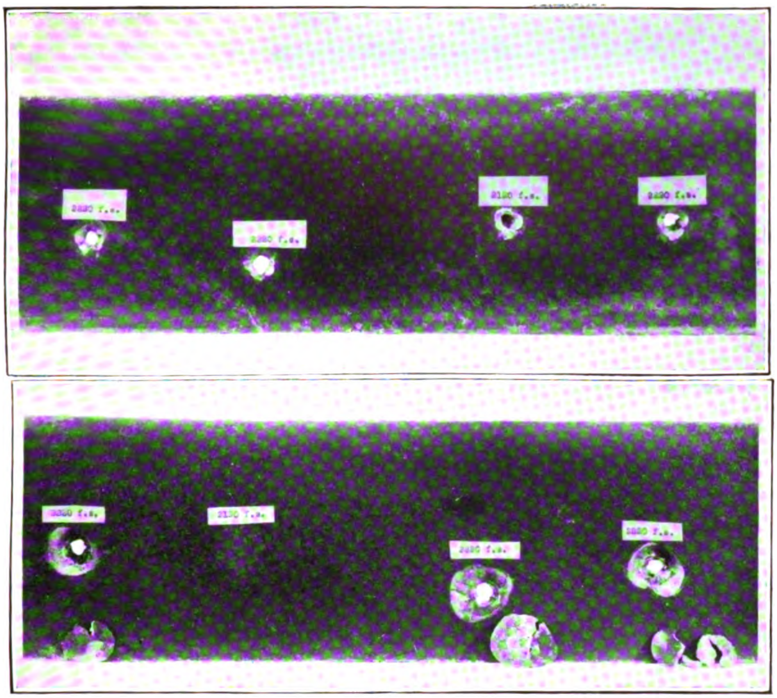


FIG. 3.—FIRING TESTS WITH ARMOUR-PIERCING BULLETS AGAINST BULLET-PROOF PLATING OF ORDINARY HARD QUALITY 0·5-INCH IN THICKNESS.

At velocities slightly in excess of specification, complete perforation occurs, with discing and flying fragments from the rear of the plate.

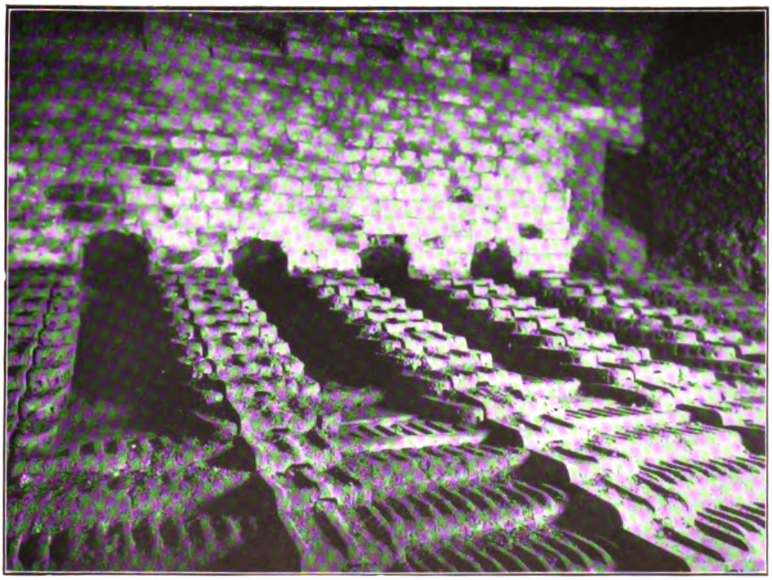


FIG. 4.—GRATE OF ERITH-ROE MECHANICAL STOKER IN CANADIAN PACIFIC STEAMSHIP COMPANY'S S.S. BEAVERFORD, CONSTRUCTED FROM CASTINGS OF "ERA" HEAT-RESISTING STEEL.

cast iron or mild steel. This is on a basis of an elongation of one thousandth of 1 per cent. per hour. Similar superiority of the heat-resisting steel, and its ability to support service in these applications at high temperatures where ordinary steel fails, are shown at other temperatures. Thus at 700° C. (1290° F.) the relative figures for " Era H.R. " and Mild Steel are 6 tons and ½ ton; and at 600° C. (1110° F.) 9 and 2 tons per square inch respectively.

The question of a suitable material for Superheater Tubes is one which has hitherto presented some difficulty, that is, where a high degree of superheat is employed. The highly alloyed types of heat-resisting steel which are of so much service in other directions, are rather high in their first cost and do not lend themselves readily to the production of tubes, which are therefore expensive. In some cases also difficulties arise from their relatively high coefficient of expansion. It will be interesting, therefore, to learn of the introduction of a new type of heat-resisting steel known as " Era 131 " which, while having the general characteristics of mild steel, and being capable of ready production in the form of tubes, possesses remarkable strength, approximately three times that of mild steel and at temperatures beyond the normal possibilities for use of the latter material, that is, 900/1000° F. (480/540° C.). Experience in the practical application of this steel is being obtained in many directions at the present time, so far with promising results.

Steam Turbine Blading.—The problem of the deterioration in use of steam turbine blading is particularly accentuated in the case of marine turbines, because of the specially corrosive effects of the steam due to the liability of the presence of salt, which, notwithstanding the most elaborate precautions, cannot invariably be avoided. Marine turbines share also with land turbines the difficulties due to erosion, and, with advancing steam temperatures, the necessity for a material for the blading superior in hot strength to that of existing materials.

The problems as regards corrosion are well met by various non-ferrous materials, but these lack strength at temperatures exceeding 800° F. (430° C.) and are subject to erosion by the steam at the " dew point " stage. High chromium, sometimes known as " stainless," steel possesses the necessary advantages as regards strength and against erosion, and for land turbines, where, in general, the steam is comparatively pure, is finding considerable use. In marine turbines it is, however, unable to resist the specially corrosive action caused by salt-contaminated steam.

A steel alloy has, however, been developed which in every way meets the requirements for marine turbine blading. This material, known as " Hecla/ATV," is one of a group of several alloys evolved by my firm in collaboration with La Société Anonyme de Commentry-Fourchambault et Decazeville, of Imphy, France, and being produced in America by the well-known firm, the Midvale Steel Company, of Nicetown, Pa. " Hecla/ATV " steel is now well beyond the experimental stage and fully established in its application for steam turbines, some 1000 tons having so far been employed for the purpose, of which some 400 tons are incorporated in marine work. Practical use under a large variety of conditions with steam temperatures ranging as high as 875° F. (470° C.), and in some cases with steam of a specially corrosive character, has so far failed to provide a single instance of failure. After periods of service extending up to 10 years, the material appears in as good condition, and with the profiles as sharp, as when the blading was first put in. Replacement by "Hecla/ATV" Steel of other blading materials which have given trouble due to corrosion or erosion has invariably resulted in a satisfactory solution of the troubles.

Besides being immune from attack by contaminated steam, "Hecla/ATV" Steel has the advantage over high chromium steel in being amenable to all the usual processes employed for the assembly of the blading, without injury to its characteristics. It can be brazed, soldered or riveted equally well with any other steel in current use for the purpose. With "stainless" steel, on the other hand, such processes as "casting in" cannot be employed, because by so doing the previous heat treatment of the steel upon which its characteristics depend, is entirely upset.

In addition to its corrosion and erosion resisting properties, a special feature of "Hecla/ATV" Steel is its remarkable strength at high steam temperatures. In this respect it is capable of sustaining service under the highest steam temperatures so far employed, or even visualised by the most enterprising engineers.

The Internal Combustion Engine.—The high temperature of the exhaust gases in the latest and most improved types of internal combustion engine has necessitated the use of heat-resisting steels for the valves, on the score both of erosion and pitting action of the gases, and of the lack of strength in the nickel steel, formerly and even now too frequently employed when the temperature approaches a red heat.

The development of the marine Diesel and semi-Diesel engine has not, up to the present, imposed such high working temperatures on the valves as in some other directions, notably in aircraft engines, and nickel steel, and in some cases even cast iron, is being used for this purpose. Nevertheless, in many instances it is obvious from the failures experienced that the limit of temperature for these materials is being reached and exceeded in service.

Fig. 6 shows a case where the head of a valve in 3½ per cent. nickel steel has in service been pulled completely away from the stem (notice the reduction of area adjacent to the fracture), due solely to the steel having become seriously weakened by the temperature at which it has been operated. Thus, even in the case of marine engines in their present state of development, the use of heat-resisting steel for the valves has become advantageous, and "Era" steel is in fact now being employed on a considerable scale for this purpose. Fig. 7 shows a group of such valves, the use of which has been attended so far with the greatest satisfaction, giving that security which is so necessary to the marine engineer, and which he cannot otherwise have. Breakdown of even so small a component puts the engine out of action, and occurring at a critical moment might cause the loss of the ship and her whole company.

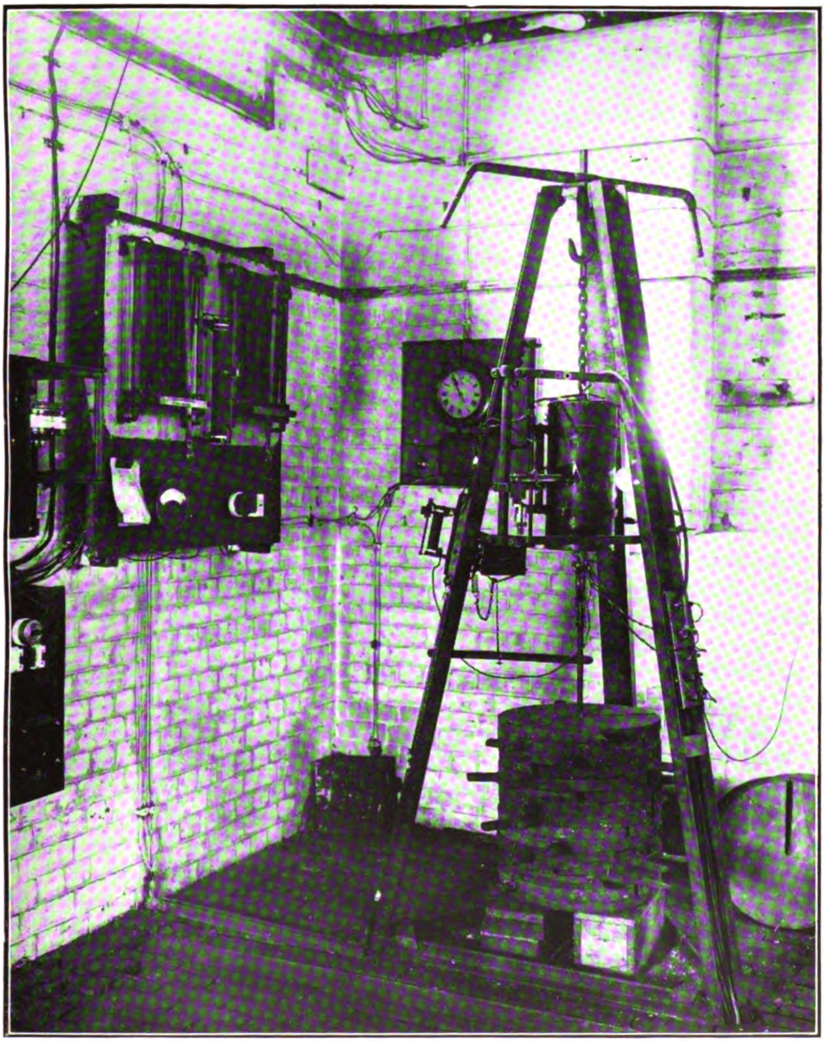


FIG. 5.—APPARATUS FOR DETERMINING "CREEP" STRESS OF STEEL AT HIGH TEMPERATURES.

In some cases, as a measure of economy, the heads are made separately in " Era " heat-resisting steel and securely attached to a stem of nickel steel.

The properties of this special heat-resisting steel are such as to obviate the necessity for water cooling with its consequent complications. Its introduction has enabled the number of spares carried to be reduced by more than 50 per cent.

Gearing.—The possibilities in marine engineering for the use of high tenacity alloy steels are more limited than in some other branches of engineering. In comparatively large masses the manufacture of alloy steels is a matter of great delicacy, from the production of the ingot, through the forging and heating operations, and special safeguards are necessary to ensure perfect confidence in the reliability of the finished forging. Nevertheless, the advantages which alloy steels offer in power transmission components of comparatively small size, for example, in aeroplanes and airships, have some attractions in the larger components concerned in marine propulsion. The same desirability exists, even if to a lesser degree, for a high margin of safety in strength and saving in weight, which latter brings with it a beneficial repercussion in the form of reduced inertia stresses.

In these circumstances judicious use has with advantage been made of steels containing additions of alloying elements, but in comparatively small percentages sufficient to give enhanced properties as compared with plain carbon steels, and without at the same time adding appreciably to the manufacturing difficulties. For such parts as turbine discs, reduction gears and shafts, steels containing small proportions of nickel or nickel and chromium are common practice to-day.

Forgings.—Reference has been made earlier in this article to improvements in metallurgical science and technique as distinct from those due to the special properties of alloy steels. The reliability of marine forgings, whether of special or ordinary steel, depends very much upon their soundness, which in turn depends upon the character of the ingots from which they are made. This is a subject to which the writer has given special attention. Briefly, by correct design of mould, and a study of the rationale of the freezing of the steel in the mould, a method had been devised by which the soundness of the resulting forgings is thoroughly assured, and with a minimum of discarded material. Thus are effected considerable economies, and at the same time that confidence in the reliability of the forgings which is so essential is achieved.

It is this method which is employed in the manufacture of ingots for forgings of all kinds by Messrs. Hadfields.

Steel for Other Purposes.

Auxiliary Machinery and Appliances.—As mentioned previously in this article, the auxiliary equipment of ships, in the large extent to which it is electrical in character, owes a great deal to metallurgical progress, both ferrous and non-ferrous. In a year when we are to celebrate the discovery by Faraday of the principle of electro-magnetic induction—the idea upon which more than upon any other the electrical industry is founded—it is appropriate to make special mention of this particular aspect of the connection between metallurgy and engineering.

Silicon Steel, the invention of the writer, in its use for the magnetic cores of transformers, dynamos and motors, and through the improved efficiency brought about by its special magnetic and electrical properties, has greatly facilitated electrical developments generally. Careful estimates have shown that the Hadfield inventions of manganese steel and silicon steel alone have already saved the world between £700,000,000 and £800,000,000—manganese steel by its extraordinary durability and toughness, and silicon steel by greatly reducing energy losses in electrical machinery and apparatus.

The progressive improvement in permanent magnet steels from the original carbon steel, through tungsten steel to the latest and best types containing cobalt, has also been highly useful in the evolution not only of those operating appliances of which permanent magnets form a part, but also of the magnetic compass, both for its needles and adjusting magnets.

The dependence of electrical technology upon the development of magnetic effects is further well described in a recent article by Mr. T. D. Yensen, of the Westinghouse Electric and Manufacturing Company, on " Magnetism and Magnetic Materials—the Basis of the Electrical Industry," in which he points out the important results which have accrued from the discovery of alloys, mostly of ferrous types, having magnetic properties of a variety of useful kinds not possessed, at any rate to the same degree, by iron itself.

Dredgers.—In those highly useful auxiliaries to the shipping industry, namely dredgers, alloy steel in the form of the writer's manganese steel, is used in considerable quantities. For the working parts of these, manganese steel has, owing to its extraordinarily hard wearing qualities and its toughness, proved invaluable. Indeed its use in this direction constitutes one of the more important applications of this material.

Those interested will find the subject well dealt with in the book on " Dredging and Dredging Appliances " by Mr. P. M. Dekker, of the Hague, who is a specialist in this matter. In this book Mr. Dekker puts together experience ranging over more than thirty-five years. Reference is there made to the advantages obtained by the use of the forged and cast " Era " manganese steel for Buckets, Tumblers, Lips, Rollers, Pins, Bushes and other wearing parts. The use of this steel, in addition to enabling the dredgers to be worked at a higher speed, has also resulted in greater efficiency. The advantages obtained must amount to at least 25 to 30 per cent.

Tool Steel.—A general survey of the benefits which marine engineering has derived from the use of alloy steels would not be complete without a reference to high-speed tool steel. The advantages which developments in this direction have brought about in engineering factories of the world, and in which marine engineers have

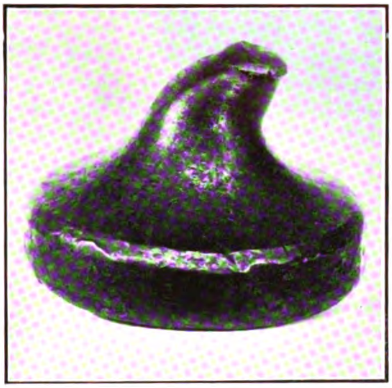


FIG. 6.—HEAD OF DIESEL ENGINE VALVE OF 3½ PER CENT. NICKEL STEEL. Fractured in service.

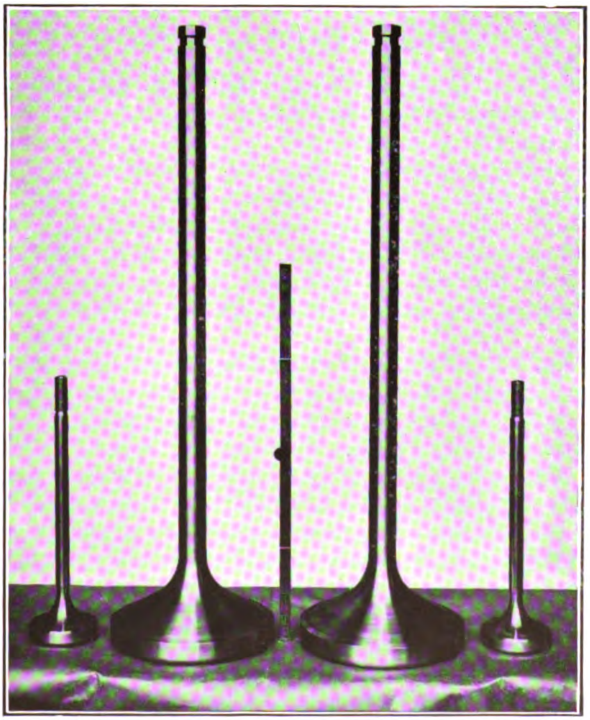


FIG. 7.—DIESEL ENGINE VALVES OF "ERA" HEAT RESISTING STEEL.

shared, are probably inestimable in their value, effecting as they do great economies in machining operations, besides much more rapid production and making constructions possible which would not be so in their absence. Matters have progressed considerably since the introduction about 1868 of the original Mushet self-hardening tools, until nowadays it is not uncommon to witness tools successfully operating with their cutting edge actually at a red heat.

Comparatively recently, high-speed tool steels representing a distinct advance have been developed, capable of sustaining specially heavy cuts, and removing a much greater amount of material before the edge requires regrinding. Certain non-ferrous materials with tungsten carbide as a base have also met with success as cutting tools, but do not provide a complete answer to the mechanic's difficulties. They are unable to withstand the heavy duty and sudden shocks experienced in intermittent cutting. In roughing cuts on forgings and castings, the new tool steels are markedly successful and superior. It is in these operations where the greatest proportion of the whole time occupied in the machining of forgings and castings down to final size can be saved. With the new steels it has in fact been found possible to machine manganese steel, a material which had hitherto defied tooling operations, at any rate in anything like a commercial way.

Future Possibilities.

Of necessity this brief account can only indicate the principal directions in which help has been afforded by the metallurgist to the marine engineer and constructor. The present-day standards, whether in the enormous size of the largest vessels now afloat and their economical working, the safety and comfort of their companies and passengers, or, in another direction, the special application of ships for war purposes, each owe very much to the assistance rendered in this way. As time goes on, and with the advance of engineering science, the dependence of the engineer upon the metallurgist must necessarily increase.

At present there seems no limit to the possibilities in the way of new and still more useful materials to be attained through the means of alloying. Utilising only the elements, some twenty-three in number, which have so far been successfully alloyed with iron, the total number of possible alloys with iron, incorporating not more than three of these elements, is 2,047, this not including the many variations of each brought about by changing the percentages employed. Admitting also more complex alloys—and experience has shown many of these may be useful also—their number is legion. By comparison the actual number of ferrous alloys so far investigated is few, and none has been fully explored for all possible useful properties.

Among the combinations yet to be made and examined, there are undoubtedly many whose properties will prove, some unique, some representing a distinct improvement upon those now at our disposal, and all of value to engineering progress when intelligent exploitation of them is made. In fact, such is now the diversity of properties which can be utilised, that the examination of any alloy must be very complete before it can be dismissed as of no utility. Even then it is possible to overlook some feature which may be of value at some time in the future, if not at present.

There is abundant scope, therefore, for the many able and willing workers who are now engaged in different countries, in investigating the many-sided aspects of the work to be undertaken, which is worthy of the best brains in all branches of physical and chemical metallurgy. From the indications I have given it is certain that results can be assured from such research. They are in fact continuously forthcoming in the form of new and useful alloys which make their appearance from time to time, and in improved knowledge regarding existing alloys. As the pioneers in this field, British metallurgists have always been prominent, and they may confidently be expected to bear their full share in the future.

ROBERT A. HADFIELD.

CHAPTER XI.

THE FLEET AIR ARM.

"... *Names and uniforms, constitutions and regulations, were altered so often that the whole change might seem to be an orgy of official frivolity, if it were not remembered that the powers brought within the reach of man by the New Service were increasing at an even greater speed. But there was no breach of continuity; the process was a process of growth; the new was added and the old was not abolished.* ..."—"The War in the Air," WALTER RALEIGH, 1922.

"*The Fleet Air Arm consists of those units which are allocated for embarkation in H.M. Ships.*"—Extract from the Air Estimates, 1930.

THAT visible sign of the renaissance of executive Naval interest in Air matters, the Fleet Air Arm of to-day, has been created through a succession of functional and administrative changes which culminated in the recommendations of Lord Salisbury's Committee on National and Imperial Defence in 1923 (see the "Annual," 1924, p. 6). Knowledge of the influences which originated these changes is, therefore, a necessary prelude to an understanding of the future effects which this power of men to move, and transport, weapons through the air may have on the control of maritime communications.

In 1909 a Conference was held in the room of the First Lord of the Admiralty to discuss a suggestion by the Secretary of State for War for the co-ordination of aeronautical thought; a scheme was drafted and presented to Mr. Asquith, the Prime Minister, who thereupon appointed "The Advisory Committee on Aeronautics."

Though the construction of lighter-than-air craft had been proposed and undertaken by the Navy as early as 1908–9, and the Navy was represented on this early Committee, sanction in 1911 to four Naval officers to learn to fly is the earliest official recognition, by the Admiralty, of the startling fact, recorded by Orville Wright in December, 1903, that "the age of the flying machine had come at last."

In the winter of 1911 the creation of a British Aeronautical Service—designated "The Flying Corps," to consist of a Naval Wing and a Military Wing—and an Air Committee to deal with all aeronautical questions affecting the Admiralty and War Office, was recommended by a sub-committee of the Committee of Imperial Defence, which, under the presidency of Lord Haldane, had been appointed to consider these matters.

THE ROYAL NAVAL AIR SERVICE.

Opinion on Naval and Military requirements led to divergent paths, so the Royal Flying Corps, as it was constituted in 1912, resolved, almost immediately, into two separate entities, the Royal Flying Corps (the Military Wing) and the Royal Naval Air Service. The latter was officially recognised in July, 1914, and a new division formed at the Admiralty to control it, named the Air Department. The Air Committee held meetings in 1912 and 1913, but being devoid of power to implement decision passed out of history.

"Safety First" was, fortunately, an undreamed-of slogan in those days and practical development proceeded with enthusiasm, but slowly; thus on the declaration of war in August, 1914, the R.N.A.S. could muster 100 officers, 600 men, and 64 aircraft; under the pressure of hostilities these figures had risen, in 1915, to 1,500 officers, 11,000 men and more than a thousand aircraft; and when, early in 1918, transfer to the Royal Air Force commenced the resources of the Royal Naval Air Service, in men and material amounted to:

5,000 officers.
50,000 men.
44 aerodromes.
7 kite balloon stations.
14 airship stations.
1,844 aeroplanes.
982 marine aircraft.

Reorganisation in July, 1915, abolished the post of Director of the Air Department, and a Rear-Admiral was appointed instead as Director of Air Services.

Airship raids in 1916, the arrival of the Fokker aeroplane—which lent the Germans temporary material superiority—and the daylight aeroplane raids over London and other parts of the country added pressure to war's disquieting influence, and created a feeling, which was publicly expressed from time to time by various responsible, and many irresponsible, persons and bodies, that the organisation and supply of the Air Services were open to criticism. The practical effect of these agitations was the creation during this period of several successive Air Committees and Boards, upon which the Navy and Army were represented, but which had no executive authority over the Royal Naval Air Service or Royal Flying Corps.

The first of these, the Derby Air Committee, was appointed to prevent competition between the Services and to increase the output of machines by co-ordination of design and the placing of orders. Dissolved within a few weeks, because its powers were advisory only, the Committee, nevertheless, paved the way for the Curzon Air Board. Lacking authority, this Board also passed away, but there emerged from it (consequent on a report from Lord Curzon which advocated the extension of the powers of the Air Board), the appointment of the Director of Air Services at the Admiralty to be Fifth Sea Lord, and the constitution of the Cowdray Air Board (Order in Council, February 7, 1917).

This latter body achieved marked progress in the supply of aircraft and implemented the recommendations of General Smuts who, presiding over two successive Committees, recommended in August, 1917, the creation of an Air Department, and, secondly, formulated plans and legislation for an amalgamation of the Air Arms of the two Services.

ESTABLISHMENT OF AN AIR MINISTRY.

Within a few months the Air Force (Constitution) Act was presented and passed through the Houses of Parliament, with scarcely perceptible opposition, and received Royal Assent on November 29, 1917.

Administrative changes consequent on this Act commenced almost immediately. At the Admiralty the Fifth Sea Lord was relieved and a Division was re-created called the Air Division, manned mainly by Air Force officers, for liaison in air operations with the Fleet.

Orders in Council were published to establish the Air Council and the new Department under the Presidency of Lord Rothermere, Secretary of State (assisted by the following, among other members of the Air Council: Major-General Sir H. Trenchard, K.C.B., D.S.O., Chief of Air Staff; Rear-Admiral Mark Kerr, C.B., R.N., Deputy-Chief of Air Staff; Commodore Godfrey Paine, C.B., R.N., Master-General of Personnel). On April 1, 1918, the Royal Air Force was officially established under a separate Ministry at the Hotel Cecil, and accepted responsibility for all Air Services, except the work of material production and the control of lighter-than-air craft.

The next eighteen months saw the reconstruction of the Air Force, and the transference of the administrative machinery of air organisation and material production from the Admiralty, the War Office, and the Ministry of Munitions, to the Air Council.

In September, 1919, the Air Division at the Admiralty was transferred to the " Coastal Area " organisation of the Air Ministry, at Thurloes Place, South Kensington, which took over the administration and supply of R.A.F. units working with the Navy, and assumed the office of adviser to the Admiralty on the execution of naval air policy. The lighter-than-air organisation was transferred to the Air Ministry in October.

The presentation of the Air Estimates at the end of this year was accompanied by a Memorandum by the Chief of the Air Staff indicating the basis on which the reorganisation of the Royal Air Force was to be undertaken; in this it was stated that " . . . it has been decided that aeroplanes will no longer be carried in capital ships as was done during the War, but will only be embarked when required to take part in Fleet exercises," and, " In addition there will be a small part of it (the Royal Air Force) specially trained for work with the Navy, and a small part specially trained for work with the Army, these two small portions becoming, in the future, an arm of the older services." Later it was made clear, authoritatively, that there was no intention to return to a small Royal Naval Air Service and Royal Flying Corps in addition to the Royal Air Force.

Thus, at the end of 1919, the Fleet air units, which were entirely Royal Air Force, came under the operational and disciplinary control of the Admiralty at sea only; naval policy was concerted between the Air and Admiralty Staff and liaison was maintained between the Navy and Air Force by the Coastal Area organisation. In effect, at this date, the Admiralty was divested of any executive authority in air matters.

The provision of aircraft and the methods of effecting the future developments of air organisation to meet Naval requirements, therefore, became the subject of conversations between the Admiralty and Air Ministry during the ensuing years; the first tangible result of which was an agreement to second junior officers from the Navy to the Air Force to be trained as pilots; in July, 1920, officers were invited to volunteer for this Service, but the response was discouraging and the order was cancelled.

In August, 1920, a small body was re-created in the Staff at the Admiralty, called the Naval Air Section, which is now (1930) called the Naval Air Division.

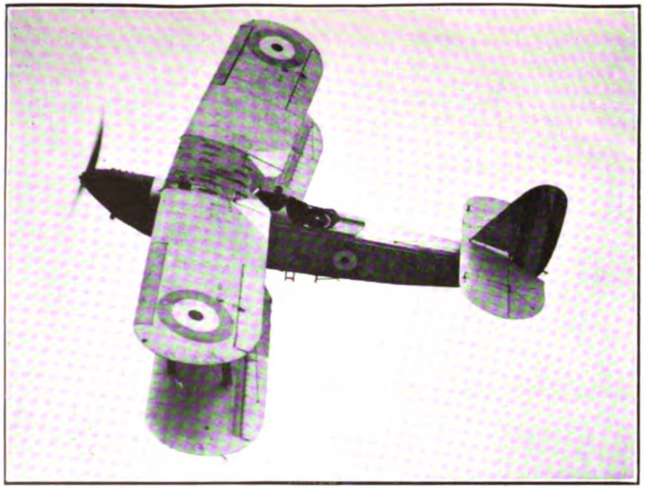
In February, 1921, volunteers were called for to be trained as observers in gunnery spotting, and a course for this purpose, consisting of six officers, began at the R.A.F. base at Lee-on-Solent; the training of naval telegraphists as telegraphist air gunners was commenced later in the year.

Institution of the Fleet Air Arm.

During the course of these conversations between the Admiralty and Air Ministry certain controversial points arose from time to time, and finally the whole question of the control of Fleet air work was submitted for consideration to a Committee on National and Imperial Defence under the Presidency of Lord Salisbury, which appointed a special sub-committee consisting of Lords Balfour, Weir, and Peel, with instructions to inquire into the control of Fleet air work. In the report (Command 1,938, dated 1923) the Committee reviewed the position as it stood, stated the points of view of the Admiralty and Air Ministry, and said, "... They do not think that the present system can remain altogether unchanged; neither do they think it possible to sever completely the Air organisation which does the work for the Fleet from the Air organisation which is responsible for Home Defence against air attack and for co-operating with the Army in other theatres of operation. A course somewhere between these two extremes is the one we recommend. . . ."

The committee made the following proposals:

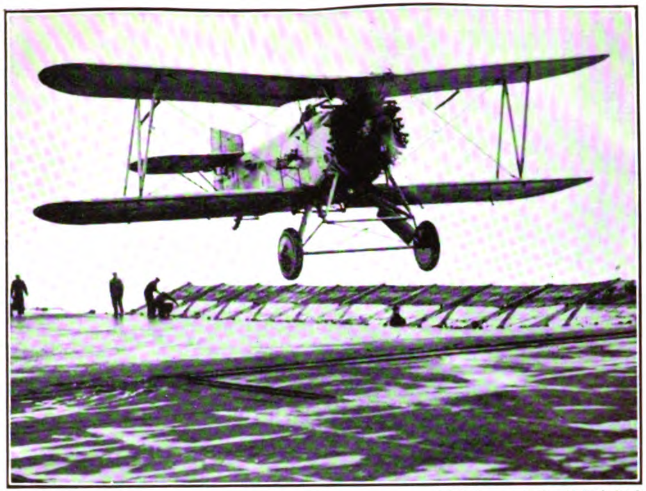
The Air Ministry should provide material at the request of the Admiralty; a code of regulations should be drawn up to meet the situations where the two services make contact; the provision of finance should be settled by Treasury in consultation with the two



[*Photograph by "Flight."*

THE BLACKBURN "RIPON" TORPEDO BOMBER.

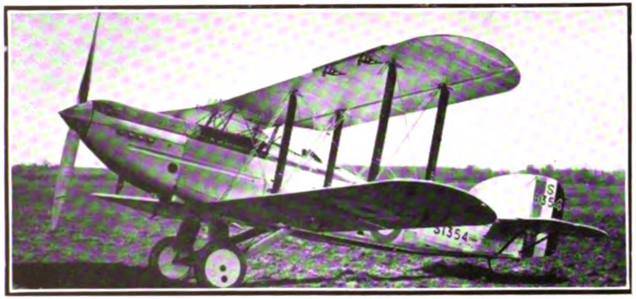
Blackburn Aeroplane Co., Ltd.



[*Photograph by "Flight."*

THE FAIREY "FLYCATCHER" FIGHTER.

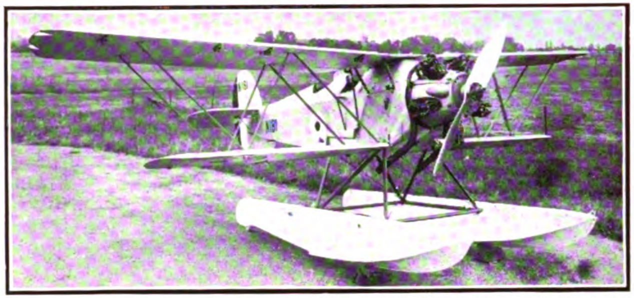
Fairey Aviation Co., Ltd.



[*Photo by courtesy of the builders.*

THE FAIREY III.F SPOTTER RECONNAISSANCE MACHINE.

Fairey Aviation Co., Ltd.



[*Photo by courtesy of the builders.*

THE PARNALL "PETO" SEAPLANE.

C. Parnall and Co., Bristol.

services; the material and personnel of Fleet Air Arm should not be withdrawn by the Air Ministry without consent of the Admiralty; an appropriate interchange of staff and technical officers should be arranged between the two Ministries; training, design of material and research work should continue to be the responsibility of the Air Ministry, the Admiralty being at liberty to make proposals regarding supplies.

Further, they recommended that naval officers should be attached to the R.A.F. for flying duties, continue to wear naval uniform with a distinguishing badge, and be under the ultimate command of officers of the Fleet with their permanent rank and promotion, subject to naval regulations; the same principle regarding uniform to apply to ratings employed in the Fleet Air Arm. The Admiralty should determine what the proportion of naval officers in the Fleet Air Arm should be, provided not less than 30 per cent. of R.A.F. officers should serve in aircraft carriers. Reconnaissance as well as spotting duties should be carried out by naval officers.

The Present Position.

Upon these recommendations was based the constitution of the Fleet Air Arm as it exists to-day; they were put into effect by a series of orders agreed between the two departments, issued as Admiralty Fleet Orders from 1924 onwards.

The Fleet Air Arm has thus emerged as an organisation under the dual control of Admiralty and Air Ministry; 70 per cent. of the pilots and all the observers and telegraphists in the aircraft are naval officers and ratings. The Admiralty has operational control of Fleet Air Arm flights, and administration is a dual responsibility.

Through the agency of a Joint Technical Committee, and an Advisory Committee on Fleet Air Arm aircraft (which are composed of staff and technical officers from the Admiralty and Air Ministry), the Air Ministry provides material to meet Admiralty wishes; and the Admiralty adjust the design of carriers and other warships to meet the requirements of aircraft.

The Air Ministry is responsible for all training carried out ashore.

Officers specialising as observers are selected at any time after they have attained one year's seniority as lieutenant. They undergo a course of training lasting nine months, which includes signals and tactics and gunnery at naval establishments in Portsmouth; and air tactics and navigation, photography, meteorology, spotting for gun fire, airmanship and bombing, while at the school of Naval Co-operation, R.A.F. base, Lee-on-Solent; they are then appointed to carriers, for ships' duties and for duty in the flights.

These qualified observers are not attached to the R.A.F. and cannot therefore be said, strictly, to be part of the Fleet Air Arm. In practice, they work with it permanently; they are paid 6*s*. a day in addition to naval rates, and, normally, are employed as observers until they attain the rank of Commander. They are, in fact, ordinary specialists.

Wireless telegraphists undergo a course of training in W/T. (*matériel* and procedure), air gunnery, and bombing at the R.A.F. bases at Gosport and Eastchurch, lasting three months, and are paid 2*s*. per diem additional to ordinary naval rates. Telegraphist air gunners, as they are called after qualification, are responsible for the operation of the W/T. sets in the aircraft, but R.A.F. personnel are responsible for the upkeep of the *matériel*.

Certain R.A.F. ratings, mainly unskilled, have been replaced in the Fleet Air Arm by naval and Royal Marine personnel; this has the effect of reducing the complements of carriers.

The Commanders-in-Chief of the principal fleets have a Wing-Commander, R.A.F. (Fleet Aviation Officer) on the staff; one naval Captain and two Commanders serve at the Air Ministry, and mutual exchanges are effected between the staff colleges at Greenwich and Andover.

The Admiralty pay a lump sum annually as a grant to Air Votes. This grant includes the pay of all personnel, including naval and Royal Marine officers in Fleet Air Arm flights, and the cost of aircraft, stores, etc., except: (1) Naval and Royal Marine officers under training who are chargeable direct to Air Votes; (2) ratings borne in lieu of R.A.F. personnel, who are chargeable direct to Admiralty Votes. The cost of the maintenance of carriers and torpedoes is charged to Naval Votes; and the cost of the shore bases to which the Fleet Air Arm may be disembarked is borne by the Air Ministry.

F.A.A. Officers' Training and Service.

The naval and Royal Marine officers who volunteer to become specialists as pilots are selected from the ranks of the Sub-Lieutenants (after they have received a Watch Keeping Certificate), Lieutenants or junior Royal Marine officers. When qualified these officers are available for flying duties (except for two years when they must return to general service), until they attain the rank of Commander or five years' seniority as Captain, R.M.; they are also available for further employment, under conditions at present undetermined, in the higher posts of the Fleet Air Arm, both ashore and afloat, after six or eight years' air experience. The time when the first entries will have attained this qualification is now approaching. They wear the uniform of their naval rank, with a distinguishing badge, and are paid 6*s*. a day in addition to ordinary naval rates.

Service in the Fleet Air Arm is no bar to further specialisation in signals, torpedo, navigation or gunnery, etc.; normally, however, it is necessary to complete four years' flying before transferring, but this in no way prejudices their chances of selection for one of these branches.

Training starts at the R.A.F. establishment at Leuchars and is continued at Gosport and Calshot.

As from the date of attachment these officers are given an R.A.F. commission to ensure their status and authority under Air Force Law when not under the Naval Discipline Act; they are, therefore, notified in the Navy List with the bracketed title (Flying Officer, or Flight-Lieutenant, R.A.F.). They enter with the rank of Flying Officer, R.A.F., and at the moment of writing twenty have reached the rank of Flight-Lieutenant.

Normal attachments to the Fleet Air Arm are for periods of, approximately, four years, punctuated by appointments of a year's duration to general service. Officers are, however, permitted to revert permanently to general service if they wish to do so after completing the first period of four years; only in exceptional circumstances is a shorter period of service accepted.

A comprehensive course of flying, engine work, rigging, armament, meteorology, airmanship, air navigation, and deck landing training, lasting eleven months, qualifies them, after a practical test of their ability to land on a carrier, for appointment to flights. This is arranged on the nomination of the Admiralty with the concurrence of the Air Ministry. On arrival on board ships they are immediately available for naval as well as R.A.F. duties.

R.A.F. officers appointed to flights in the carriers are nominated by the Air Ministry; the names of the officers of higher rank being previously submitted to the Admiralty.

The allocation of flights to carriers is based on the size of the fleet to which they are attached, and the numbers of carriers in commission; it varies, and is shown in the current Navy List. Experience has proved that the most flexible unit for active operations with the Fleet is a flight; each flight is self-contained, and consists of six aircraft. The personnel includes six pilots (and for multiseaters an observer for each aircraft), and about thirty-three other ranks and ratings. In addition to active flights, a permanent flight for administrative, technical, and ground operational duties, is borne in each carrier. This is named "Headquarters Flight," and consists in the Courageous of seven officers, and 136 other ranks and ratings. The whole organisation is under the command of a senior Royal Air Force officer, usually a Wing-Commander, who advises the Captain of the carrier on air matters, and in effect bears the same relation to him as does the head of any other department.

Single aircraft with a proportionate crew are detached from these flights for work from other ships fitted to carry them.

OPERATIONS.

If aircraft are to be of any value to a Commander of forces afloat, they must be available, immediately, at any average moment. Aircraft working from shore bases can join in a previously concerted movement, but their availability with a fleet is governed by their capacity to remain in the air and not by the distance they can fly. Fifteen years ago seaplanes were limited in their functions, because it was necessary to stop ships to hoist them in or out, and they were (and are to-day) able to operate only from a fairly calm surface. Catapulting is a post-War development. Airships were (and are) undeveloped and vulnerable.

For these reasons the Fleet was deprived during the War of any effective assistance from the air, not because the personnel lacked skill, or because the value of air operations was under-estimated, but simply because the technical development was below the standard required to produce aircraft and an aerodrome which could accompany the Fleet. The carriers of to-day with their aircraft are, within limits, unaffected by the turbulence of the waves, and therefore are unfettered in the moment and locality of their operations; this applies also to ships fitted with catapults, but to a rather more limited extent, since the aircraft will not usually be able to return to their ship. If fitted as seaplanes a return will be possible but its practicability will naturally be greatly affected by the state of the sea.

Various combinations were investigated in the early years of the War: aeroplanes and seaplanes in capital ships, cruisers, and seaplane carriers; ships were fitted with flying-off platforms, but without a landing-on deck; aircraft flew off lighters towed at high speed, and flying-boats were taken to the scene of action in lighters. No satisfactory solution presented itself until in August, 1917, Lieutenant E. H. Dunning landed an aeroplane on the forecastle flying-off deck of H.M.S. Furious. This success led to the construction of a landing deck aft in H.M.S. Furious. The building of H.M.S. Argus (the first ship to be fitted with a flush deck) and the aircraft carriers which accompany the fleets to-day, followed; but these ships were not completed in time for them to take any active part in the concluding stages of the War; the subsequent development in operating aircraft from carriers and catapulting from other classes of ship, which is now all in the day's work, belongs almost entirely to the post-War period.

The functions of sea-borne aircraft in amphibious operations, with a fleet (or single ships) are:

1. Reconnaissance, in which may be included photography and spotting for gunfire.
2. Offensive action, which comprises torpedo, bombing or machine-gun attack against enemy objectives, ships or aircraft.

In the case of amphibious operations the mobility of an aircraft carrier with its self-contained force of aircraft is a valuable adjunct in affecting a concentration of force by surprise; thereafter the operation is comparatively static and the problems which arise are no longer circumscribed by a horizon of tactical thought which is purely naval. The despatch of H.M.S. Courageous to Palestine in 1929 is an example. The ship embarked a battalion of troops and six flights of aircraft, at Malta; sailed and completed the disembarkation of these forces at Jaffa, a distance of 1,000 miles, in less than seventy hours.

In unlimited waters the operations of aircraft with ships introduce more complex issues. The first is that of exact navigation of these high-speed aircraft over a surface which is featureless, through an element composed of winds which may vary in direction and strength at different heights and in adjacent localities. In addition, these aircraft move between bases and objectives travelling at inconstant speeds in ever-varying directions.

Other issues which arise and are immediately affected by the first are the early and accurate location of any opposing force; the despatch of an air offensive against it; the selection of time and conditions which present the most favourable opportunity for launching this offensive; the possibility of achieving surprise; the furthering of the air attack against surface craft by air offensive against opposing aircraft; the selection of the surface objective and the choice of military load—i.e. bombs, torpedoes, or petrol—to meet the moment.

In narrow waters, the matter is simpler since departures, bearings, and landfalls, which may be obtained from adjacent coasts, mitigate the difficulties of navigation.

PROSPECT.

The progress made in the employment of ship-borne aircraft in the last decade, cannot be made public; nevertheless official announcements that "good progress continues to be made in all branches of naval air work" pretend an innocence which is positively judicial. The problems which are engaging attention, some of which have been enunciated, have aroused an enthusiasm and a concentration of resources which it would be difficult to exaggerate.

The work started by the Navy and continued by the Royal Air Force is being crystallised by an organisation which owes allegiance to both of those services. This organisation hammered out of many considerations, under the clamant pressure of unfavourable war situations, the excitements of victory and in the calmer atmosphere of peace conditions by a multitude of eminent statesmen, sailors, soldiers, and airmen, is insatiable in its demands. It requires from those who elect to serve as pilots, a readiness to encounter risks and difficulties rare in other services, a wide technical and tactical knowledge, steadiness and swift reaction, perfect physique and inexhaustible patience; from the observers—the navigators—all those qualities combined with a meticulous mental accuracy; and between the two perfect mutual understanding and confidence.

On the other hand, it offers to those who enter it the broadening experience of association with another service; a training, which develops mental and physical activity and individual initiative, unrivalled since the disappearance of masts and sails; a mastery over the most advanced form of transport, and experience of Fleet work otherwise difficult to obtain in the junior ranks; and, since pilots are free, within limits, to revert to naval duties entirely at any time, it endows them with qualifications for employment in a greater number of posts, especially in the higher ranks.

Beyond all, the Fleet Air Arm is that branch of the Navy and Royal Air Force which, by virtue of the capacity of carriers and mobility of ship-borne aircraft, must be the spearhead of the Services in sea-board emergencies and operations; and upon whose activity, accuracy and aggression the success of the British Fleet in future battles may chiefly depend.

APPENDICES.

AIRCRAFT CARRIER TONNAGE.

The total tonnage of aircraft carriers of over 10,000 tons each permitted by the Washington Treaty is 135,000 tons. The London Naval Treaty makes provisions which has some effect on the categorical calculations of this tonnage; but substantially, in the computation of ships constructed for the specific and exclusive purpose of carrying, flying-off and landing-on aircraft, Great Britain is bound to the figure stated.

Ships in this category are: Glorious, Courageous, Furious, Eagle, Hermes, and Argus, the total tonnage of which is 115,350.

Other ships fitted to carry aircraft, which, in some cases, can fly them off but cannot in any case land them on, are: Vindictive, Pegasus (on disposal list), Ark Royal, and Submarine M.2.

Catapults are now installed in several vessels, including H.M. ships Resolution and Frobisher. Finality in design has not yet been reached, but exhaustive trials, in liaison with Air Ministry, are being carried out from H.M.S. Ark Royal.

R.N. AND R.M. PERSONNEL IN FLEET AIR ARM, 1930.

R.N. and R.M. Pilots.	R.N. Observers.	R.N. and R.M. Ratings
120	82	655

FLEET AIR ARM AIRCRAFT.

The number of flights is 23½ (and one small reconnaissance float-plane for use from submarines). The proportion is: 10½ flights of spotter reconnaissance; 8 flights of single-seater fighters; 5 flights of torpedo bombers.

Aircraft and Engine.	Function.	Performance.		Armament.
		Top Speed.	Endurance.	
Fairey III.D. (Napier Lion 450 h.p.)	Spotter Reconnaissance (Float or Ship three-seater)	126 m.p h.	5½ hours at 86 m.p.h.	Machine guns and/or bombs and/or torpedoes
Blackburn Blackburn (Napier Lion 450 h.p.)	Spotter Reconnaissance (Ship four-seater)	99 m.p.h.	4 hours at 75 m.p.h.	
Fairey III.F. (Napier Lion 570 h.p.)	Spotter Reconnaissance (Ship or Float three-seater)	130 m.p.h.	5½ hours at 90 m.p.h.	
Blackburn Dart (Napier Lion 450 h.p.)	Torpedo Bomber (Ship single-seater)	106 m.p.h.	3½ hours at 75 m.p.h.	
Blackburn Ripon (Napier Lion 570 h.p.)	Torpedo Bomber (Float or Ship, two-seater)	132 m.p.h.	4 hours at 115 m.p.h.	
Fairey Flycatcher (Bristol Jaguar 390 h.p.)	Single-seater Fighter (Float or Ship)	130 m.p.h.	3½ hours at 104 m.p.h.	
Parnall Peto (Armstrong-Siddeley Mongoose 135 h.p.)	Spotter Reconnaissance, two-seater (Light Float)	113 m.p.h.	2 hours at 100 m.p.h.	

The names of these flights indicate the characteristics of the aircraft. Aircraft is a generic term for any form of material which is capable of supporting itself in the air; aeroplane, generally, covers the heavier-than-air craft; seaplane includes flying-boats and float-planes; ship-plane is an aeroplane for use in ships; float-plane is any aeroplane fitted with floats for work over water.

The performances of ship planes (which are convertible by changing the undercarriages) as float-planes are proportionately reduced. Obsolescent types are in the process of replacement by more modern aircraft, details of which are not available for publication.

FLYING-BOATS AND SHORE-BASED SQUADRONS.

These aircraft are manned and operated entirely by the Royal Air Force. Since they are designed for maritime operations and might therefore be used in co-operation with naval units, a brief reference to their location and characteristics is made here.

Squadron/Station.	Type.	Engine.	Performance/Armament.
36 Singapore	Hawker Horsley Torpedo Bomber	690 h.p. Rolls Royce Condor.	Top speed, 129 m.p.h. Endurance 10 hours at cruising speed. Torpedo Machine Guns.
202 Malta	Fairey III.F. Float-plane Reconnaissance	—	Bombs, Machine Guns.
209 Mount Batten, Plymouth	Blackburn Iris III. Flying-boat Reconnaissance	3/675 h.p. Rolls Royce Condor.	Top speed, 103 m.p.h. Endurance 8¼ hours at 80 m.p.h. Machine Guns.
201 Calshot 203 Basra 204 Mount Batten, Plymouth 205 Singapore	Supermarine Southampton Flying-boats	2/470 h.p. Napier Lion	Top speed 108 m.p.h. Endurance about 10 hours at cruising speed. Bombs and Machine Guns.

CONTROL OF AVIATION IN FOREIGN COUNTRIES.

30/6/1930.

Country.	Is there a separate Air Force apart from Army and Navy?	If not, what is Organisation for Army and Navy Flying.
Czecho Slovakia	No	Separate Military Air Service, which is a branch of the Army.
France	Yes, but the appointments of C.A.S. and A.C.A.S. are held by Naval or military officers. There is a special service of naval air personnel.	—
Germany	Naval and Military Air Forces not permitted	—

CONTROL OF AVIATION IN FOREIGN COUNTRIES—*continued.*

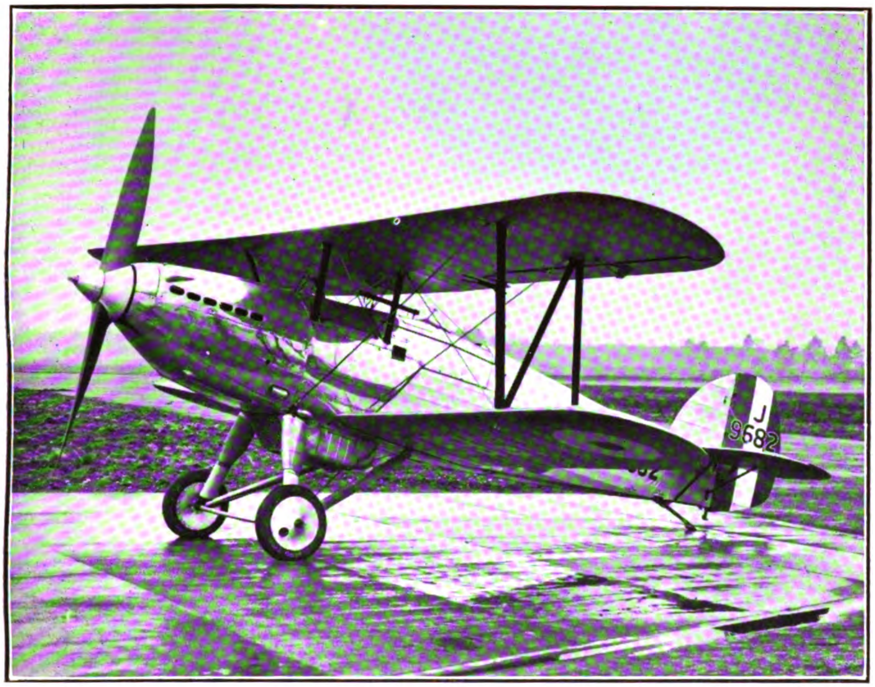
Country.	Is there a separate Air Force apart from Army and Navy?	If not, what is Organisation for Army and Navy Flying?
Greece	No, but there is an Air Ministry which has executive control of Naval and Military Services	Separate Naval and Military Air Services, which are branches of the Army and Navy.
Italy	Yes	—
Japan	No	Separate Naval and Military Air Services.
Roumania	No	Separate Naval and Military Air Services, which are branches of the Navy and Army.
Russia	Yes	--
Spain	Yes	--
United States	No	Separate Naval and Military Air Services.
Yugo Slavia	No.	Separate Naval and Military Air Services, which are branches of the Navy and Army.

In the compilation of this article, use has been made of the following works, to the authors of which acknowledgment is made: "The War in the Air," Raleigh; "The Beginnings of Organised Air Power," Speaight; "The Story of a North Sea Air Station," Gamble.

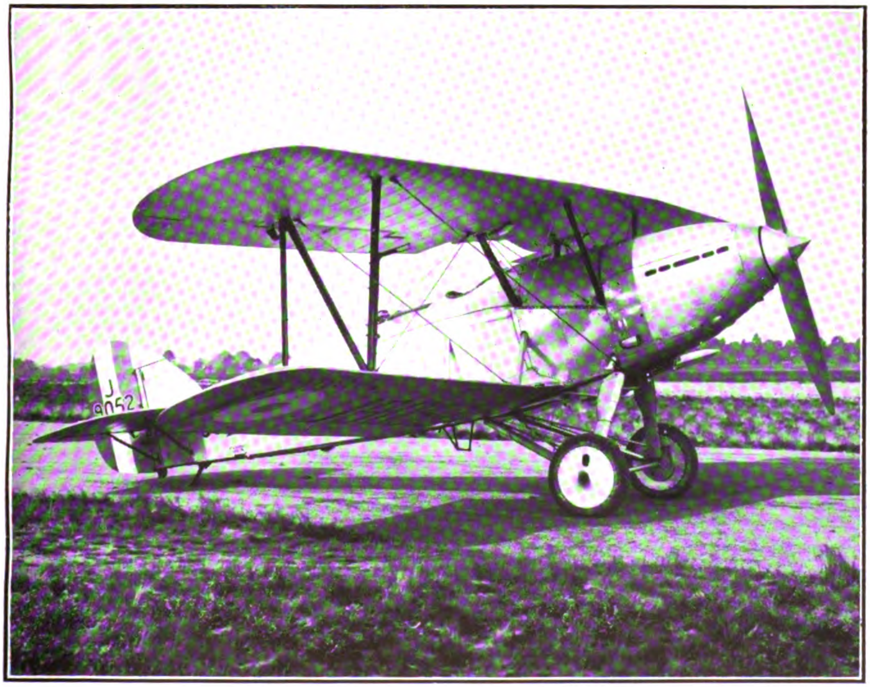
PHŒNIX.

⁂ Since the above was written, an announcement has been made, with the sanction of the Air Ministry, that the Hawker Engineering Company have been informed that two of the new types of aeroplanes produced by them have been selected for service with the Fleet. The fast bomber known as the Hart will be adapted for Fleet spotter reconnaissance purposes, and the machine originally named the Hornet is to be the new type of Fleet fighter aircraft.

Another decision respecting the Fleet Air Arm was taken in November, when an order was placed with the Irvin Air Chute Company, of Letchworth, to equip machines with the Irvin quick-release type harness. All aircraft in the Fleet Air Arm, except the Fairey Flycatchers, are to be equipped with this parachute.—EDS.



THE HAWKER "FURY" FIGHTER.

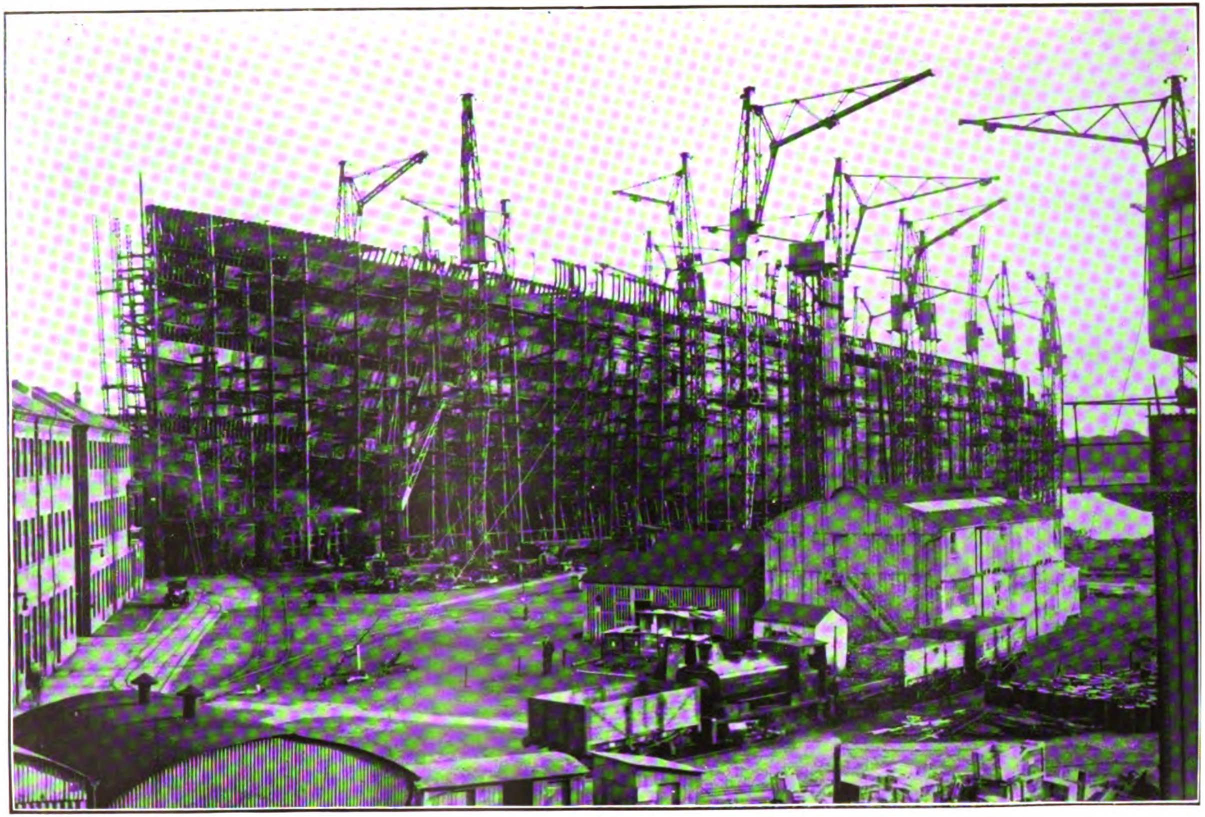


THE HAWKER "HART" BOMBER.

Hawker Engineering Co., Ltd., Kingston.

(Royal Air Force Official—Crown Copyright Reserved.)

MERCHANT SHIPPING SECTION.



CANADIAN-PACIFIC S.S. EMPRESS OF BRITAIN ON THE STOCKS.

(Builders, Messrs. John Brown & Co., Clydebank.)

CHAPTER XII.

STANDING OF THE WORLD'S MERCHANT FLEETS.

DURING times of acute industrial depression, which invariably re-act on shipping and the freight market, there are those who regard with disfavour any policy which will add to the carrying capacity of the mercantile marine. The yearly net increase of tonnage is a variable quantity, and, in recent years, has fluctuated between 142,952 tons and 1,761,750 tons, the latter figure, which occurred in 1928, representing, in fact, a larger yearly addition than had been made in any one year since 1920–21. For the last six years the figures are 617,851 tons for 1925; 142,952 tons for 1926; 408,540 tons for 1927; 1,761,750 tons for 1928; 1,119,653 tons for 1929; and 1,533,332 tons for 1930. It will be shown, however, that, as evidence of the addition of carrying capacity to the general freight market, these figures must be taken with qualification.

TABLE I.—TONNAGE OF THE WORLD.

Year.	Steam and Motor.		Sail.		Total.	
	No.	Tons.	No.	Tons.	No.	Tons.
1913	23,897	43,079,177	6,694	3,890,936	30,591	46,970,113
1914	24,444	45,403,877	6,392	3,685,675	30,836	49,089,552
1915	24,508	45,729,208	6,212	3,532,561	30,720	49,261,769
1916	24,132	45,247,724	6,035	3,435,412	30,167	48,683,136
1919	24,386	47,897,407	4,869	3,021,866	29,255	50,919,273
1920	26,513	53,904,688	5,082	3,409,377	31,595	57,314,065
1921	28,433	58,846,325	4,773	3,128,328	33,206	61,974,653
1922	29,255	61,342,952	4,680	3,027,834	33,935	64,370,786
1923	29,246	62,335,373	4,261	2,830,865	33,507	65,166,238
1924	29,024	61,514,140	3,932	2,509,427	32,956	64,023,567
1925	29,205	62,380,376	3,711	2,261,042	32,916	64,641,418
1926	29,092	62,671,937	3,523	2,112,433	32,615	64,784,370
1927	28,967	63,267,302	3,205	1,925,608	32,175	65,192,910
1928	29,387	65,159,413	3,021	1,795,246	32,405	66,954,659
1929	29,612	66,407,393	2,870	1,666,919	32,482	68,074,312
1930	29,996	68,023,804	2,717	1,583,840	32,713	69,607,644

Owing to the War, statistics were not compiled regarding the vessels recorded in Lloyd's Register Books for the years 1917 and 1918.

According to statistics published by Lloyd's Register, the total tonnage owned throughout the world as in June, 1930, is 69,607,644 gross tons (Tables I and II), of which 20,438,444 tons represent ownership in Great Britain and Ireland. Of this total, sailing ships account for only 1,583,840 tons, a remarkable drop compared with June, 1914, when sailing ships represented 8·1 per cent. (2,360,000 gross tons) of the world's tonnage. The present percentage is under 2·3.

TABLE II.—TONNAGE OWNED BY PRINCIPAL MARITIME COUNTRIES.
(In thousands of tons, '000 omitted.)

	Great Britain and Ireland.	United States (Sea-going).	Japan.	Germany.	Italy.	France.
1914	19,257	2,970	1,708	5,459	1,668	2,319
..	..	..	..	..	..	..
1919	16,555	10,782	2,325	3,503	1,370	2,234
1920	18,330	13,790	2,996	673	2,242	3,245
1921	19,571	14,697	3,355	717	2,651	3,652
1922	19,296	14,738	3,587	1,887	2,866	3,846
1923	19,281	14,597	3,604	2,590	3,034	3,737
1924	19,106	13,530	3,843	2,954	2,832	3,498
1925	19,441	12,949	3,920	3,074	3,029	3,512
1926	19,400	12,365	3,968	3,111	3,241	3,490
1927	19,309	12,070	4,033	3,363	3,483	3,470
1928	19,875	11,997	4,140	3,777	3,429	3,344
1929	20,166	11,835	4,187	4,093	3,285	3,379
1930	20,438	11,388	4,317	4,229	3,331	3,531

	Norway.	Holland.	Sweden.	Spain.	Denmark.	Total all Nations.
1914	2,505	1,496	1,118	899	820	49,089
—	..	..	..	..	..	..
1919	1,858	1,592	993	751	702	50,919
1920	2,219	1,793	1,073	997	803	57,314
1921	2,584	2,226	1,160	1,165	964	61,975
1922	2,601	2,633	1,115	1,283	1,038	64,371
1923	2,552	2,626	1,208	1,260	997	65,166
1924	2,505	2,556	1,254	1,240	1,036	64,024
1925	2,680	2,601	1,301	1,185	1,060	64,641
1926	2,842	2,565	1,338	1,163	1,081	64,784
1927	2,824	2,654	1,365	1,162	1,060	65,193
1928	2,968	2,817	1,447	1,164	1,068	66,955
1929	3,324	2,939	1,510	1,162	1,056	68,074
1930	3,668	3,086	1,624	1,232	1,088	69,608

More than half the sailing ships (53·3 per cent.) are owned in the United States, the tonnage amounting to 843,547 gross tons. Great Britain and Ireland come next with 117,000 tons, and then follow Canada with 90,000 tons, Finland with 70,000 tons, Italy with 69,000 tons, and France with 60,000 tons. If barges, small vessels usually towed, and various craft included in the sailing-ship statistics because, not being self-propelled, they fall almost automatically into that category, are omitted the tonnage of real sailing vessels, in the popular conception of the term, is now only about 825,000 tons, of which 286,000 tons (34·6 per cent.) are owned in the United States, 70,000 tons in Finland, and only 18,000 tons in Great Britain and Ireland. With the passing of the Garthpool, there are no large sailing ships—full-rigged ships—owned in the British Isles at all, a matter which, incidentally, makes it increasingly difficult for prospective officers to obtain sail training in British ships.

Sailing ships to-day have not the advantages they had, say, sixteen years ago. They require a fairly large crew, which at present rates of wages represents a considerable item of expenditure, and their gear is costly to buy and to keep in first-class condition. The tea clippers and the wool clippers have gone so long ago that now they are invested with a glamour of romance unknown to those who sailed in them. There are a few grain ships like the Herzogin Cecile, Favell, and C. B. Pedersen, which in recent years have made more or less spectacular races and, there being no others of their class left, have received their due meed of publicity. They have not, however, found conditions too easy, and are likely soon to go the way of the Thermopylæ, Cutty Sark, and many other celebrated clippers.

Trade appears to be left for the smaller sailing ships in carrying what is known as split wood—short ends and oddments which have to be man-handled ashore. Steamers cannot afford to wait the fortnight or so which, consequently, it takes to unload and handle such stuff. Finnish craft may be seen carrying most of this trade. In a general survey of shipping conditions to-day, however, sailing ship tonnage may be ignored, the bulk of seaborne traffic having fallen first to the steamship and now also to the motorship, which takes an increasing share of the business.

TABLE III.—PERCENTAGE OF TONNAGE OWNED BY PRINCIPAL MARITIME COUNTRIES, 1898, 1914, AND 1930.

	1898. per cent.	1914. per cent.	1930. per cent.
Great Britain and Ireland	54·0	41·6	29·9
United States (Sea)	3·8	4·5	15·7
Japan	2·3	3·8	6·3
Germany	8·4	11·3	6·2
France	5·0	4·2	5·1
Norway	3·2	4·3	5·4
Italy	2·3	3·1	4·8
Holland	1·8	3·2	4·5

Still quoting Lloyd's Register statistics—which are the most fruitful source of shipping information extant, surpassing in usefulness, promptitude, and international comprehensiveness, all data supplied by the maritime countries themselves—it is convenient therefore to consider the figures of power-operated tonnage, and in Tables III and IV comparative figures are given for 1898, 1914, and 1930. These figures show some remarkable variations as between the 16 years before the War and the 16 years after its outbreak. The period 1898–1914 represents 16 years of economic development unbroken by any extensive war operations, whereas the following 16 years cover the whole of the war period, the immediately following economic dislocation, the struggle of various groups of workers to dominate industry, and the consequent interference, by strikes and lock-outs, with the natural development of trade and commerce. The one was thus a period of greater tranquillity than the other ; but some stocktaking must be undertaken sooner or later, and these years, chosen by Lloyd's Register in their Annual Survey when bringing out the 1930 edition of the Register Book, afford a convenient opportunity for measuring the effect of the great European disturbance.

The percentage figures in Table III are very striking. In 1898 there was owned in Great Britain and Ireland 54 per cent. of the

TABLE IV.—COMPARISON OF STEAM AND MOTOR TONNAGE AT JUNE, 1898; JUNE, 1914; AND JUNE, 1930.

Gross Tonnage of Steamers and Motorships owned in the world as recorded in Lloyd's Register Book for the years 1898, 1914, 1930.

Countries.	1898.	1914.	1930.	Difference between	
				1914 and 1898.	1930 and 1914.
Great Britain and Ireland . .	10,547,000	18,892,000	20,322,000	+ 8,345,000	+ 1,430,000
British Dominions	621,000	1,632,000	2,788,000	+ 1,011,000	+ 1,156,000
Denmark. . .	308,000	770,000	1,072,000	+ 462,000	+ 302,000
France . . .	973,000	1,922,000	3,471,000	+ 949,000	+ 1,549,000
Germany . .	1,644,000	5,135,000	4,199,000	+ 3,491,000	− 936,000
Greece . . .	151,000	821,000	1,391,000	+ 670,000	+ 570,000
Holland . . .	356,000	1,472,000	3,079,000	+ 1,116,000	+ 1,607,000
Italy . . .	442,000	1,430,000	3,262,000	+ 988,000	+ 1,832,000
Japan . . .	454,000	1,708,000	4,317,000	+ 1,254,000	+ 2,609,000
Norway . . .	619,000	1,957,000	3,663,000	+ 1,338,000	+ 1,706,000
Spain . . .	545,000	884,000	1,207,000	+ 339,000	+ 323,000
Sweden . . .	329,000	1,015,000	1,594,000	+ 686,000	+ 579,000
United States (Sea)	1,176,000	2,027,000	10,646,000	+ 3,111,000	+ 8,619,000
,, (Lakes)		2,260,000	2,458,000		+ 198,000
Other Countries	1,346,000	3,479,000	4,555,000	+ 2,133,000	+ 1,076,000
Totals .	19,511,000	45,404,000	68,024,000	+25,893,000	+22,620,000

steam tonnage (there were no motorships of any consequence in those days); to-day, the figure has shrunk to less than 30 per cent. In the same period the proportion of the United States has risen from 3·8 per cent. to 15·7 per cent. This observation, however, requires qualification. The large fleet of American-owned ships is something of a wasting asset. It is becoming less efficient every year and the total is dwindling. A little reflection will show the reason. In 1914 the tonnage of sea-going sailing ships, steamers, and motorships (vessels plying on the Great Lakes are obviously excluded) owned in the United States was 3,790,578 tons. The extraordinary development of American shipbuilding resources during the War resulted in the total reaching no less than 14,738,506 tons in 1922 (Table V). Some of this tonnage, built with more haste

TABLE V.—UNITED STATES TONNAGE.

(Sail and Power, but excluding Great Lakes).

	Gross Tons.
1914	3,790,578
1919	10,782,170
1920	13,789,874
1921	14,697,088
1922	14,738,506
1923	14,579,035
1924	13,530,544
1925	12,948,632
1926	12,364,668
1927	12,070,050
1928	11,997,441
1929	11,835,176
1930	11,388,367

than skill, was found unsuitable for post-War trading conditions. Some of it was surplus to shipping requirements. The peculiar conditions surrounding ownership and operation under Government control did not fit it for that intensive management demanded by privately owned firms as the first consideration of profitable employment. Consequently, a large proportion was laid up, and, for lack of employment, much of it has since been sold for scrap.

Statistics published by the United States Bureau of Navigation show that at August 1, 1930, of the 2,099 vessels of 9,441,951 gross tons which had been registered on behalf of the American Shipping Board, only 465 of 2,603,760 tons remained on their list. Of the other 1,634 ships of 6,838,191 tons, 798 of 3,887,517 tons had been sold to American citizens and 587 of 1,788,767 tons had been scrapped. Figures from the same source also show that at June 30, 1930, 267 vessels of 586,953 tons privately owned in America and 274 vessels of 1,509,126 tons owned by the Shipping Board were laid up—a total of 541 ships of 2,096,079 tons. In many respects, therefore, the American figures, if regarded as evidence of potential competition, should be accepted with reserve. Table X indicates that as a whole the American fleet is not as modern as the fleets of European nations. That this is the case is recognised in America, and many projects have been set afoot to build new tonnage, particularly high-class passenger liners, for the construction of which large subsidies in the form of mail contracts are available.

Apart from the abnormal American situation, it will be seen, however, from a study of Table III, that the British proportion also has declined because of a general advance of all the other maritime nations with the exception of Germany and Austria. The Austrian mercantile navy was 1,052,000 tons in 1914; to-day it has no existence. While, therefore, it must be remembered that some of the tonnage owned in America is inert, the increase of the world's steam and motorship tonnage between 1914 and 1930 was 22,620,000 tons, of which the British increase was only 1,430,000 tons, or 6 per cent., whereas the increase during the period 1898–1914 was 25,893,000 tons, the British figure being 8,345,000 tons, or 32 per cent.

Those whose business it is to run ships as commercial undertakings, to pay dividends on their operation and to induce investors to provide the necessary capital for further expansion, have for years been lamenting the activities of the shipbuilding districts in adding tonnage to an already overburdened market. In pointing to one immediate cause of their difficulties, they, however, omit to recognise that the shipbuilder builds only at the behest of his customers, and if these customers—other shipping interests—see in the near enough future a profitable outlet for this new tonnage, then the builder has no concern for the possible discomfiture of those whose ships are getting older. Indeed, conceivably, the builder may welcome such a situation as, within certain limits, the economic pressure of the modern and less expensively operated vessels will compel the other owners to order newer ships by way of retaliation. This process is well known and should give pause to those who, especially during an acute freight depression such as that of 1930, regard any activity of the shipyards as little less than a crime, for in so doing they have to assume that the whole output is a menace to the overseas carrying trade with which they are so vitally concerned.

The process of thinking that because, say, 3,000,000 tons are under construction then 3,000,000 tons will soon be competing on the freight market may have been reasonable 30 years ago. To-day, from a variety of causes, this line of argument does not hold good, and the past year is a very striking instance of this abnormality. The shipyards, not only in this country but also abroad, were kept going very largely with the construction of oil tankers. What the proportion is can be seen from Table VI.

TABLE VI.—PROPORTION OF SHIPBUILDING CONSTRUCTION ABSORBED BY OIL TANKERS.

	Oil Tankers.	Total Shipbuilding.	Percentage Tankers.
Jan. 1, 1922	793,193	4,457,393	18
,, 1923	300,128	2,954,318	10
,, 1924	175,164	2,444,336	7
,, 1925	309,270	2,470,436	12
,, 1926	308,439	2,069,545	15
,, 1927	371,520	1,933,027	19
,, 1928	744,668	3,118,721	24
,, 1929	361,972	2,618,001	14
Oct. 1, 1929	400,913	2,817,339	14
Jan. 1, 1930	627,756	3,110,880	20
Oct. 1, 1930	1,034,144	2,569,036	40

In last year's issue of this "Annual" the writer of the chapter entitled "Shipping and the Oil Industry" made the following observation: "Before leaving the subject of the tanker, an economic aspect of considerable importance may be noticed. An oil tanker is engaged on a highly specialised transportation service. It carries its cargo outwards and returns empty. Owing to the nature of the cargo and the form of construction it is practically impossible for it to pick up a freight on the homeward run. The oil industry must, therefore, bear the full burden of the transportation charges. With coal the situation is different. It should bear the cost of carriage in one direction, leaving the shipper of wheat, or other bulk cargo, to pay for the return voyage."

He elaborated his argument to show that, in practice, the wheat and coal freights react on one another. This applies in its most elementary form to the River Plate trade. It is not necessary to follow his reasoning except to show that oil tankers, so far, are a class by themselves. They constitute a highly specialised form of transportation which, at least on a broad survey, does not touch the general freight market. Any review of shipping statistics should therefore eliminate from the grand total the large fleet of tankers. In a comparative survey it should be remembered that the growth of the oil tanker fleet has been very rapid during recent years, and when comparing grand totals of shipping to-day with those of even 1914 the influence of this form of transportation is not unimportant. The figures in Table VII will illustrate this point. Thus oil tankers in 1914 represented 3 per cent. of the world tonnage. To-day the figure is more than 11 per cent. Through the preponderance of tanker tonnage building in 1930 this percentage will soon be higher.

TABLE VII.—PERCENTAGE OF TANKERS TO TOTAL WORLD TONNAGE (SAIL EXCLUDED).

	Total World Tonnage (Sail excluded).	Tankers.	Percentage Tankers.
	Gross Tons.	Gross Tons.	
1914	45,404,000	1,479,000	3
1919	47,897,000	2,929,000	6
1920	53,905,000	3,354,000	6
1921	58,846,000	4,419,000	8
1926	62,672,000	5,665,000	9
1928	65,159,000	6,620,000	10
1929	66,407,000	7,071,000	11
1930	68,024,000	7,628,000	11

It was fashionable, a few years ago, for politicians to plead for a naval holiday. One or two prominent shipowners have lately been asking for a merchant shipbuilding holiday. While the tonnage under construction—fortunately for the shipbuilding centres—does not indicate an entire cessation of work, an analysis of the figures shows that quite a small proportion consists of general cargo ships, so that the output of the yards at present is not such an embarrassing figure for the shipbroker—unless he be concerned with oil freights—as it may appear at first sight.

In addition to these tankers there are, however, many other types of craft which should be eliminated. Lloyd's Register in their Annual Survey exclude all tankers (the figure for 1930 was 1,038 tankers of 1,000 gross tons and upwards amounting to 7,536,368 tons and 91,536 tons of tankers of less than 1,000 tons); trawlers and other fishing vessels and whalers amounting to 965,864 tons; tugs and salvage vessels, 371,677 tons; steam barges, dredgers, and similar craft, ferries, river vessels, and vessels owned by municipal corporations and harbour authorities, 791,468 tons; and paddle ships 319,094 tons. Thus without taking into account size, age, or material, there are over 10,000,000 tons of vessels which are not used for ordinary cargo and passenger purposes. One should also disregard, (*a*) vessels trading on the Great Lakes of North America; (*b*) wood vessels; (*c*) vessels of less than 5,000 tons gross; and (*d*) vessels over 25 years old and presumably of less efficiency than more modern vessels, with the exception of a few which although up to 30 years old are still capable of a high speed. The figures thus obtained are given in Table VIII and indicate the relative position of the principal maritime countries of the world as regards the larger ocean-going vessels available for general cargo and passenger purposes.

TABLE VIII.—TONNAGE OF THE LARGER OCEAN-GOING STEAMERS AND MOTORSHIPS AVAILABLE FOR GENERAL CARGO AND PASSENGER PURPOSES.

Countries.	Total Steam and Motor Tonnage.		Estimated Ocean-going. Tonnage.	
	Tonnage Owned.	Percentage of World Total.	Tonnage Owned.	Percentage of World Total.
Great Britain and Ireland .	20,321,920	29·87	10,439,753	38·47
United States	13,202,261	19·41	5,372,806	19·80
Germany	4,199,096	6·17	2,151,162	7·93
Japan	4,316,804	6·35	1,739,031	6·41
Holland	3,079,000	4·53	1,731,881	6·38
France	3,470,591	5·10	1,587,905	5·85
Italy	3,261,922	4·80	1,492,391	5·50
Norway	3,663,237	5·39	515,496	1·90
Other Countries	12,508,973	18·38	2,105,770	7·76
World totals . . .	68,023,804	100·00	27,136,195	100·00

This table shows the relatively high efficiency of the merchant fleet of Great Britain and Ireland, which, while comprising less than 30 per cent. of the world tonnage as recorded in the Register Book, has nearly 38½ per cent. of the more efficient ocean-going tonnage available for general cargo and passenger purposes. Considerable differences are also shown as regards three other countries, viz. Holland and Germany, which from percentages of 4·53 and 6·17 respectively of the total tonnage rise to 6·38 and 7·93 per cent. of the larger ocean-going tonnage, and, on the other hand, Norway, which from 5·39 per cent. is reduced to 1·90 per cent. It should be stated, however, that this reduction is due to the very large proportion of tanker tonnage included in the Norwegian merchant marine.

It has been customary in this "Annual" to compile annually a table of tonnage available for carrying goods and passengers. The analysis is not so drastic as in the foregoing tables, since ships of all sizes and ages are included. The figures for 1930 are given in Table IX, with comparative totals for 1927, 1928, and 1929.

TABLE IX.—TONNAGE AVAILABLE FOR CARRYING GOODS AND PASSENGERS.

	Gross Tons.	Gross Tons.
Total Tonnage of the World	—	69,607,644
Sailing Ships	1,583,840	
Oil Tankers, 1,000 tons and over . . .	7,536,368	
Oil Tankers, under 1,000 tons	91,536	
Trawlers and other Fishing Vessels . . .	965,864	
Tugs and Salvage Vessels	371,677	
Steam Barges and Dredgers	791,468	
Paddle Steamers	319,094	
Lake vessels, U.S.A.	2,558,479	
Lake vessels, Canada	321,950	
	———	14,540,276
Steam and Motor Tonnage available for goods		55,067,368
Comparative figure for 1929		54,080,656
,, ,, ,, 1928		53,332,592
,, ,, ,, 1927		52,182,481

Two other points should be considered in an analysis of these figures—the ages of the ships and their speed. Both are important, the latter especially so when the statistics of the last few years are compared with those of 1914 or 1898. The general size of cargo ships tends to increase. In 1914 there were 3,608 steamers and motorships each of 4,000 tons or more. Now the number reaches 6,556. Through improvements in machinery modern ships are able to travel economically at higher speeds and, ton for ton, to do more work per annum than used to be the case. While the most spectacular examples are the new large North Atlantic liners—the Cunard Line has stated that it had been found possible in the new designs to maintain a regular weekly schedule between this country and America with two vessels, whereas three are required to-day—this process of speeding up extends to all classes of vessels, and in a marked degree to cargo liners. The pace in this direction has been set by the motorships, the economical fuel consumption of which has made such an advance possible.

The consequence is that a much greater quantity of cargo can be carried annually per ton, gross or capacity, than was the case 16 years ago. Then 10 knots was considered adequate. To-day 15 knots is quite common, and so rapid have been the changes that on certain routes that speed is already insufficient. This advantage of the Diesel engine has placed the motorship well in the forefront of shipping transport, and of the 3,696 motorships now in existence, there are 915 of 4,000 tons and above, an increase of 171 as compared with June, 1929. One hundred and fifty-four of them are of between 8,000 and 10,000 tons, and 78 are of 10,000 tons and upwards.

From Table X, in which steamers and motorships are classified according to their age, it will be noticed that there are 3,486 vessels less than five years old, with a tonnage representing 16·5 per cent. of the total steam and motor tonnage. Vessels of 25 years and over number 8,273, but their tonnage is less than that of the 3,486 newer vessels. Of the vessels built in 1905 or before, 62 per cent. are of less than 1,000 tons each, and the average size of the others is 2,926 tons; while of the vessels built during the last five years, only 39 per cent. are of less than 1,000 tons each, and the average of the others reaches 5,055 tons. Of the 1,059 vessels of 8,000 tons and upwards now in existence, 284 have been built during the last five years.

Nearly 23 per cent. of the tonnage owned in Great Britain and Ireland is less than five years old. The only countries which have a larger proportion of new tonnage (less than five years old) are Norway with 30·2 per cent. and Holland with 23·9 per cent. On the other hand, France, Japan, and Spain have only between 11 and 13 per cent.; while of the United States sea-going vessels only 4·1 per cent. is less than five years old. Of the tonnage registered in Great Britain and Ireland 84·2 per cent. is under 20 years old, while the percentage for the tonnage owned abroad is less than 71.

The group of vessels with the largest aggregate of tonnage is that of between 4,000 and 6,000 tons each, amounting to 19,711,241 tons and equal to 29 per cent. of the world's total steam and motor

TABLE X.—AGE OF STEAMERS AND MOTORSHIPS (LLOYD'S REGISTER)

	Under 5 years.		5-10 years.		20-25 years.		25 years and over.		Total Tonnage Owned.	
	No.	Tons.	No.	Tons.	No.	Tons.	No.	Tons.	No.	Tons.
Great Britain and Ireland . . .	1,243	4,581,614	1,287	4,950,083	813	1,594,679	1,657	1,615,051	7,856	20,321,920
Australia and New Zealand . . .	65	90,924	89	144,166	101	106,047	164	90,485	603	677,981
Canada. . . .	116	268,068	95	220,799	105	142,996	206	264,281	744	1,234,713
U.S.A. (Sea) . .	117	441,176	285	1,516,376	188	439,668	477	678,304	2,857	10,645,730
Belgium	28	104,186	19	51,521	23	61,061	55	106,283	238	546,002
Brazil	26	56,693	11	6,334	82	149,592	147	200,556	346	543,613
Denmark . . .	71	207,835	154	283,394	57	63,406	165	197,557	643	1,071,521
France	105	428,495	240	951,868	215	381,202	363	441,838	1,501	3,470,591
Germany . . .	266	939,379	568	1,551,988	272	363,082	462	561,980	2,138	4,199,096
Greece	11	35,454	7	25,299	89	333,513	350	713,124	546	1,390,899
Holland	287	736,344	227	812,089	131	281,110	221	136,389	1,381	3,079,000
Italy	112	509,013	151	615,057	120	327,239	422	950,514	1,105	3,261,922
Japan	197	498,273	274	574,021	158	308,652	468	929,794	2,060	4,316,804
Norway	288	1,107,174	291	659,661	190	206,721	459	479,663	1,905	3,663,237
Spain	59	152,716	73	214,983	46	50,434	357	468,027	795	1,207,093
Sweden	66	223,355	117	304,180	149	162,244	646	499,000	1,306	1,594,313
World total (including smaller countries)	3,486	11,221,912	4,245	13,529,041	3,295	6,329,247	8,273	10,832,979	29,996	68,023,804

tonnage. The big liners, e.g. those of 15,000 tons each and upwards, represent only 4·9 per cent. of the total tonnage ; it may be noted that 53·6 per cent. of this liner tonnage is owned in Great Britain and Ireland.

Examination of the machinery statistics given by Lloyd's Register shows that development is proceeding along the lines of either steam turbines or Diesel engines. There are now 1,464 steamers of 10,413,000 tons fitted with turbine engines or a combination of steam turbines and reciprocating engines, and 3,696 vessels (including auxiliary vessels) of 8,096,337 tons fitted with internal combustion engines, as compared with 730,000 tons and 220,000 tons respectively in 1914.

It may be stated that while in 1929–30 there was an increase of 1,468,000 tons in the tonnage of motorships, and of 368,000 tons in the tonnage of vessels fitted with steam turbines, the tonnage of steamers fitted solely with reciprocating steam engines decreased by 220,000 tons. The increase in the motorship tonnage at June, 1930, as compared with June, 1925, amounts to 5,382,000 tons, and the rapid strides made by this type is indicated in Table XI.

TABLE XI.—NUMBER AND GROSS TONNAGE OF MOTORSHIPS.

Lloyd's Register Book.	Motorships (including Auxiliary Vessels).	
	No.	Gross Tons.
July, 1914	297	234,287
,, ,, ...	..	..
,, 1919	912	752,606
,, 1920	1,178	955,810
,, 1921	1,472	1,248,800
,, 1922	1,620	1,542,160
,, 1923	1,795	1,666,385
,, 1924	1,950	1,975,798
,, 1925	2,145	2,714,073
,, 1926	2,343	3,493,284
,, 1927	2,552	4,270,824
,, 1928	2,933	5,432,302
,, 1929	3,246	6,628,102
,, 1930	3,696	8,096,337

An interesting feature is the comparatively large proportion of motor tonnage included in the merchant navies of some countries (Table XII). While the total motor tonnage amounts only to 11·6 per cent. of the total tonnage owned in the world (in Great Britain and Ireland 11·1 per cent.) the percentage is much higher in the Scandinavian countries—35·2 in Norway, 32·5 in Denmark, and 29·4 in Sweden. Among the principal maritime countries, France and the United States have the smallest proportions of motor tonnage, viz. 4·1 and 4·7 per cent. respectively.

An analysis of the type of machinery now employed also shows that there are recorded in Lloyd's Register Book 150 vessels, with a total tonnage of 1,265,929 tons (included in the above-mentioned totals for turbine vessels), which are fitted with a combination of

TABLE XII.—STEAMERS, MOTORSHIPS (INCLUDING AUXILIARIES) AND SAILING SHIPS OWNED IN THE PRINCIPAL MARITIME COUNTRIES AT JULY, 1930 (LLOYD'S REGISTER).

Country.	Steamships.		Motorships.		Sailing Ships.		Total.	
	No.	Gross Tons.	No.	Gross Tons.	No.	Gross Tons.	No.	Gross Tons.
British Empire .	9,172	20,648,422	789	2,461,688	793	271,504	10,754	23,381,614
Great Britain and Ireland . . .	7,329	18,060,046	527	2,261,874	382	116,524	8,238	20,438,444
United States (Sea)	2,565	10,026,335	292	619,395	673	742,637	3,530	11,388,367
,, ,, (Lakes)	529	2,424,949	13	32,620	33	100,910	575	2,558,479
Japan	1,781	3,910,613	279	406,191	Not	recorded	2,060	4,316,804
Germany . . .	1,719	3,615,149	419	583,947	19	30,139	2,157	4,229,235
France	1,420	3,323,680	81	146,911	150	60,288	1,651	3,530,879
Italy	932	2,750,555	173	511,367	275	69,304	1,380	3,331,226
Norway . . .	1,555	2,373,165	350	1,290,072	11	5,052	1,916	3,668,289
Holland . . .	994	2,526,028	387	552,972	20	7,315	1,401	3,086,315
Sweden . . .	1,047	1,116,702	259	477,611	111	29,625	1,417	1,623,938
Greece	533	1,385,029	13	5,870	Not	recorded	546	1,390,899
Spain	697	1,078,719	98	128,374	96	24,644	891	1,231,737
Denmark . . .	496	718,130	147	353,391	62	16,485	705	1,088,006
Brazil	312	486,801	34	56,812	42	15,164	388	558,777
Belgium . . .	225	489,476	13	56,526	5	7,035	243	553,037
Russia	292	388,262	52	140,833	3	3,001	347	532,096
Total for all Maritime Countries .	26,300	59,927,467	3,696	8,096,337	2,717	1,583,840	32,713	69,607,644

steam turbines and reciprocating engines. Another interesting particular is that in the case of 67 vessels with a tonnage of 308,281 tons, a comparatively new system of propulsion has been adopted, viz. electric motors connected to the screw shaft, these motors being supplied with current from generators that are driven either by steam turbines or by oil engines. Of these vessels, 53 of 235,947 tons are owned in the United States, including three of over 20,000 tons each.

The transition from coal to oil continues, and is indicated in Table XIII. Although a few ships are now running on powdered coal, progress in this direction is very slow and the numbers of such ships so small that they may be ignored in any statistical comparisons.

TABLE XIII.—PERCENTAGE OF TONNAGE FITTED FOR EMPLOYING OIL OR COAL AND PERCENTAGE OF SAILING SHIPS TO THE GRAND TOTAL.

	Percentage of Total Gross Tonnage.			
	1914.	1922.	1929.	1930.
Sailing vessels and sea-going barges .	8·06	4·70	2·45	2·27
Oil, etc., in internal combustion engines	0·45	2·35	9·73	11·63
Oil fuel for boilers	2·65	22·34	28·53	28·53
Coal	88·84	70·61	59·29	57·57
	100·00	100·00	100·00	100·00

Hopes have been raised at different times during the last ten years that a great deal of the older tonnage would be broken up. Various schemes have been propounded for accelerating the process, and last year a Departmental Committee of the Board of Trade was appointed to consider the possibility of devising means for encouraging owners to scrap their vessels rather than sell them abroad, the object being to prevent them from getting into the hands of certain nationals who, through either an entire absence—or a general laxity—of shipping laws and restrictions, coupled with low wages costs, can run them competitively. The other aspect, taken up with enthusiasm by the shipbuilders, is that new vessels might be built to replace old ones—a point of view not entirely shared by the shipowner who would prefer to see the world tonnage figure decline or remain stationary for some years.

In the meantime only cold economic pressure, coupled with losses by casualty, operates in removing these old vessels. The figures (Table XIV) vary widely from year to year, and fluctuate so much that little real guidance for the future can be obtained even when they are examined over a long period. In commenting on them the Society emphasises one interesting point—the considerable decrease in the percentage lost during the last five years as compared with other quinquennial periods in pre-War times. The average yearly percentage of steam tonnage lost during the years 1925–29 amounts only to 0·71 per cent., while, for instance, during the years 1909–13 the average was nearly 1·17 per cent. These figures, it is suggested, may to some extent be influenced by the large amount of tonnage laid up during recent times.

TABLE XIV.—TONNAGE LOST OR BROKEN UP.

Year.	Steamers and Motorships.		Sailing Ships.	
	No.	Tons (gross).	No.	Tons (net).
1916	1,288	2,724,041	511	284,224
1917	2,605	6,607,261	748	520,206
1918	1,294	3,332,791	325	159,919
1919	425	524,172	241	112,658 (gross)
1920	370	518,595	215	138,959
1921	344	536,537	215	137,720
1922	511	743,866	205	143,946
1923	709	1,456,870	259	259,909
1924	777	1,614,662	239	243,017
1925	553	980,794	186	161,241
1926	656	1,226,873	182	117,070
1927	469	852,398	154	139,671
1928	584	1,220,176	121	94,471
1929	672	1,458,665	120	84,937

WAR LOSSES INCLUDED IN THE ABOVE TABLE.

Year.	Steamers and Motorships.		Sailing Ships.	
	No.	Tons (gross).	No.	Tons (net).
1916	942	2,189,079	245	139,609
1917	2,211	5,957,913	523	392,449
1918	911	2,674,428	141	69,744

The figures for steamers broken up vary to a very large extent from year to year. During the period 1905–09 the minimum was 120,003 tons, and the maximum 251,900 tons; during 1910–14 the variation was from 87,737 tons to 245,891 tons. During the years 1915–20 practically no tonnage was broken up, the yearly average amounting to only 10,000 tons. Quite different conditions are shown for recent years. During 1921 the tonnage broken up amounted to 77,500 tons; it increased to 315,000 tons for 1922, and to 963,000 tons for 1923; and for the year 1924 the total reached 1,174,000 tons. The tonnage broken up during 1925 amounted to 653,000 tons, and to 799,000 tons during 1926, but during the year 1927 the vessels broken up amounted to only 403,000 tons. The figures for 1928 and 1929 show an increase, having reached 736,000 tons and 944,000 tons respectively.

The aggregate steam tonnage broken up during the seven years, 1923–29—5,670,000 tons—represents a yearly average of under 1⅓ per cent. of the tonnage owned. Adding to these figures the tonnage of steamers and motorships lost through casualties during the same period—3,137,000 tons—it will be seen that the average wastage of seagoing merchant tonnage (except sailing vessels) barely exceeds 2 per cent. per year of the tonnage owned.

The total figures for tonnage broken up during the seven years include 1,340,000 tons registered in Great Britain and Ireland; 1,939,000 tons in the United States; 713,000 tons in Italy; and 592,000 tons in France.

Although as regards Great Britain and Ireland the tonnage broken up during this period represents a smaller percentage of the total tonnage owned than in the case of tonnage owned abroad, this difference is accounted for by the fact that a considerable number of the older vessels are purchased from Great Britain and Ireland by other countries, the result being that while of the tonnage now owned in Great Britain and Ireland less than 16 per cent. consists of vessels of 20 years of age and above, the tonnage owned abroad comprises over 29 per cent. of vessels of this age.

While it is recognised that shipbuilding output has been far below normal a survey of the year's statistics suggests that specialised construction in the shape of oil tankers, whalers, and so on has taken the place of cargo carriers. As the year progressed without owners showing any marked inclination to order general cargo ships there came a pause which should strengthen the freight market in the event of any revival of trade. Owners of general cargo ships have more nearly achieved their ambition of a shipbuilding holiday than, perhaps, is generally realised.

JOHN P. TAYLOR.

CHAPTER XIII.

THE SPECULATIVE CHARACTER OF SHIPPING.

THE course of events in 1929 and 1930 demonstrated very plainly the speculative character of shipping and, in fact, of all international commerce. On first thoughts a reasonable measure of permanence might be expected in the arrangements for the feeding of the nations, and it is largely in helping to supply immense numbers of persons with the necessaries of life that shipping is employed. These services are among the chief essentials of oversea commerce. The vital work of growing and marketing crops and of transporting them from one quarter of the globe to another would appear to be of a character very different from many other activities, such as, for example, the business of dealing in stocks and shares. The production, marketing, and transport of foodstuffs must continue, and the investment of capital in these industries would seem to be at least one of the most useful ways in which money can be applied.

Yet these essential services are shown to be subject in a very marked manner to the influence of Nature and to variations in the sources of supply outside the control of men. The unfortunate fate which overtook the shipping industry of the world in 1930 can be traced, in a large measure, to the beneficence of Nature. A factor which was largely responsible for the course of events in that year was the exceptionally fine summer throughout Europe in 1929, resulting in grain harvests much above the average. Consequently, the needs of Europe for imports were much reduced. Apparently the possibility of such a restriction of demand had not been foreseen. Owners, in contracting for new ships, had assumed that the average requirements for tonnage which had ruled for many years would be maintained. Had the experience with the harvests in 1929 been reversed and crops been below the normal the demand for shipping to transport grain would have expanded and rates of freight would have risen.

It is to be assumed that the excellence of the European harvests of 1929 was advantageous to the countries which gathered them, for these became entirely, or mainly, self-supporting. Funds which would have been paid to oversea growers were thus kept within their own borders. Still, this conservation of resources within the countries which otherwise would have been transferred abroad must have acted unfavourably on the lands which had habitually supplied great quantities of grain. These countries had less money to spend in buying the manufactures of other nations, and, generally, there was a shrinkage of oversea commerce.

EFFECTS OF VARYING HARVESTS.

As it happened, the exceptionally bountiful crops in Europe coincided with a decline in the harvests of Canada and Argentina—two great producing countries. Had the oversea crops been equal to the normal, Europe would have been unable last year to absorb them. There were in Canada, at the end of 1929 large amounts of grain carried over from the preceding year, and another bumper crop would have intensified still further the difficulties of disposing of all the supplies. The size of the crops in North and South America would seem to have been actually less important for the shipping industry than the dimensions of those in European countries, for it is indirectly on the latter that the demand for grain transport must chiefly depend.

Owners found all their calculations upset by the harvests of 1929. In contracting for tonnage they are largely influenced by the costs of shipbuilding. When they believe these costs to be low they place orders, and in the two or three years preceding 1930 much new tonnage was ordered in the belief that the level of building costs was likely to trend upwards. Building was also encouraged by the undoubted increase in the efficiency of modern vessels as compared with older types, and improvements in marine engineering and appreciation of the greater economy to be secured by the use of larger vessels contributed to the placing of many of the orders for new ships. How disappointing was the actual experience for owners was shown by the necessity of taking new vessels direct from the building yards to mooring-up berths. Such an immediate result of construction was, indeed, tragic. The new ships represented a very large expenditure of capital and, as it turned out, their owners would have done far better had they invested their resources in gilt-edged securities. Instead of the ships being producers of revenue they became liabilities, for even the laying-up of ships costs money. Those owners who built modern tonnage are deserving of much sympathy. They proved to have been over-optimistic, but they provided much work in the shipyards when it was badly needed. Their intention was to help to maintain the high standing of the British Mercantile Marine instead of allowing it to sink to a level associated with the shipping industries of some countries in which the average age of the vessels is much higher. The trade of the world went against the shipping industry in 1930 owing to causes quite beyond the control of shipowners, and the effects of the disappointments were far-reaching, including much unemployment among seafarers and a decrease in the demand for fuel for shipping.

UNEMPLOYED TONNAGE.

The course of events last year was indicated in the various statistics which are compiled. Among the most instructive of these figures are the returns prepared by the Chamber of Shipping of the tonnage laid up idle in the principal ports of Great Britain and

Ireland. When the statistics for 1930 are set besides those for 1929 the deterioration in the situation is clearly seen as follows :—

Date.	1930.		1929.	
	No. of Ships.	Net Tonnage.	No. of Ships.	Net Tonnage.
January 1 . . .	167	352,659	166	329,771
April 1 . . .	416	892,154	141	236,242
July 1	370	918,853	145	381,158
October 1 . . .	368	885,418	122	265,997

It will be observed that the tonnage idle on each of the quarterly dates of 1930 was much above that for the corresponding dates of 1929. The biggest advance occurred on April 1, and the highest point was reached on July 1, when a generally adverse situation for shipping was intensified by the normal midsummer quietness. By October 1 the figures showed some recovery, to which the usual autumnal increase in the demand for tonnage contributed.

FREIGHT INDEX NUMBERS.

The other principal indices are the freight index numbers compiled by the Chamber of Shipping, and from the following table it will be seen that the monthly rates for 1930 (average for 1913 taken as 100) were much below those for 1929 and 1928 :—

Month.	1930.	1929.	1928.
January	83·59	121·97	108·3
February . . .	80·98	120·73	104·7
March	77·56	113·12	106·8
April	83·03	111·20	106·0
May	73·12	109·95	102·4
June	78·12	103·03	104·7
July	77·01	105·13	105·2
August	88·08	104·91	109·5
September . . .	86·50	106·67	110·2
October	77·91	97·69	116·3
November . . .	86·24	98·03	124·7
December . . .	—	89·02	124·3

Shipping services were, therefore, being rendered at rates well below those of 1913; yet expenses, including wages, were much higher. Working costs were estimated by the Chamber of Shipping to be, at the beginning of the year, about 70 per cent. above the level of 1913. This figure was confirmed in the late summer by a leading ownership, which on comparing the working costs of two vessels with those for corresponding voyages in 1913 found that the increases ranged between 71 and 75 per cent.

This table shows how low were rates of freight, while the returns of idle tonnage indicate that the level of the rates was not the only trouble, for a large amount of shipping could not be employed at any rates whatever. The effect of the low level of the rates in the summer of 1930 was intensified by the necessity of bringing home a large amount of shipping to be laid up in home ports. In some instances, owners were ready to accept rates which at best made their losses rather smaller than would have been incurred in bringing the ships home in ballast for many thousands of miles. Such ballast voyages, involving the expenditure of fuel, obviously spell entire waste.

The annual report of the Chamber of Shipping, published in February, dealt with the conditions in 1929. These were substantially better than those in 1930 ; yet it had to be said that 1929 had been a year of deep disappointment. The promise of better trade offered by the small, but steady, improvement in freights in 1928 was not fulfilled. The improvement in the latter part of 1928 continued during the early months of 1929, but during the summer freight rates began to ease, and in the early autumn, when there were hopes of the usual seasonal rise, the slump began in earnest, the decline extending to nearly all trades.

DEPRECIATION AND DIVIDENDS.

An examination of the accounts of shipping companies published in 1929, which reflected the experience of 1928, showed, the Chamber wrote, that there was a sharp decline in the earnings of " tramp " vessels, that the liner companies had paid lower dividends, and that their reserves had been further depleted. Some of the " tramp " companies had been unable to pay any dividends and had even failed to make adequate provision for depreciation. Many, indeed, were unable to make any provision at all under this heading.

At this point it is appropriate to recall that those shipping ownerships, and particularly the liner companies, which in better years had been very cautious in their finance, were again thoroughly vindicated in their policy. Their practice of putting substantial proportions of their earnings to reserves, instead of distributing the whole of them in dividends, was fully justified. These reserves, and the earnings on them, greatly assisted the companies to weather the bad times. The speculative character of shipping was a special reason for the strict observance of cautious finance.

GROWTH OF TRADE AND SHIPPING.

Discussing the causes of the shipping depression, the Chamber recalled that in its previous report it had pointed out that, on the basis of the existing supply of tonnage, the trade of the world would have to increase by from 30 to 40 per cent. over the pre-War standard to restore the level of prosperity for shipping which was then ruling. The commerce of the world had, in fact, increased by only 10 per cent. on the pre-War figures, whereas the volume of tonnage, and the movement of shipping, had risen by 32 per cent. Tonnage under flags other than the British had been built in excess of the normal pre-War rate. Consequently, there was a great excess of supply over the demand for it, resulting not only in idle tonnage but also in the equally serious problem of under-employment of tonnage in movement. The greater speed of vessels, enabling more voyages to be made in the course of the year, was equivalent to the production of more tonnage.

The policy of the United States in assisting in one way or another the construction of much shipping and its maintenance in service must be taken into account. Subsidised shipping of this character must divert trade from lines worked on ordinary commercial methods, and it has undoubtedly increased the difficulties of those countries which have to maintain large mercantile marines in order to provide employment for the seafaring sections of their populations. Many of the nations have become largely maritime, because, unlike the United States, they have been unable to provide sufficient employment for their people on the land within their own borders. Their shipping industries have had to support themselves, whereas much of the shipping of the United States has been directly subsidised by the Government.

Low Rates Illustrated.

At the annual meeting in February of the Chamber of Shipping, Sir Arthur Sutherland, an experienced owner of cargo shipping on the North-East Coast of England, who succeeded to the Presidency, declared that the gathering was being held at a time when the fortunes of the shipping industry surely seemed to be at their lowest ebb, and he gave various examples of the very low rates of freight which were then being quoted. In the outward trades he cited rates of from 6*s*. 6*d*. to 7*s*. a ton for coal from the Tyne to Genoa. The port charges and loading expenses in the Tyne and the costs of discharging in Genoa absorbed 2*s*. 10*d*. a ton, leaving the shipowner 3*s*. 8*d*. a ton for the sea carriage of about 2,365 miles, which was equivalent to 1¾*d*. a ton for every 100 miles.

In the homeward grain trade the ruling rate was then 11*s*. 6*d*. a ton, as compared with 25*s*. a year before. Deducting loading and discharging expenses, which amounted to 4*s*. 10*d*. a ton, there remained for the shipowner a net sea freight of 6*s*. 8*d*. a ton for the carriage across 6,589 miles, equal to a little less than 1¼*d*. a ton for each 100 miles. Actually in June the freight from the River Plate to the United Kingdom fell to about 10*s*. a ton.

Another rate quoted was 22*s*. 6*d*. a ton for wheat from Australia to Europe, which compared with 37*s*. 6*d*. a ton in the previous year. The port charges and loading and discharging expenses absorbed 13*s*. 5*d*. a ton, so that the shipowner was left with 9*s*. 1*d*. a ton for the sea carriage of over 11,055 miles, or about 1*d*. a ton for each 100 miles. In September a vessel was chartered on Admiralty terms to carry coal from South Wales to Cape Town—a distance of 6,000 miles—at 5*s*. a ton, representing 1*d*. a ton for 100 miles.

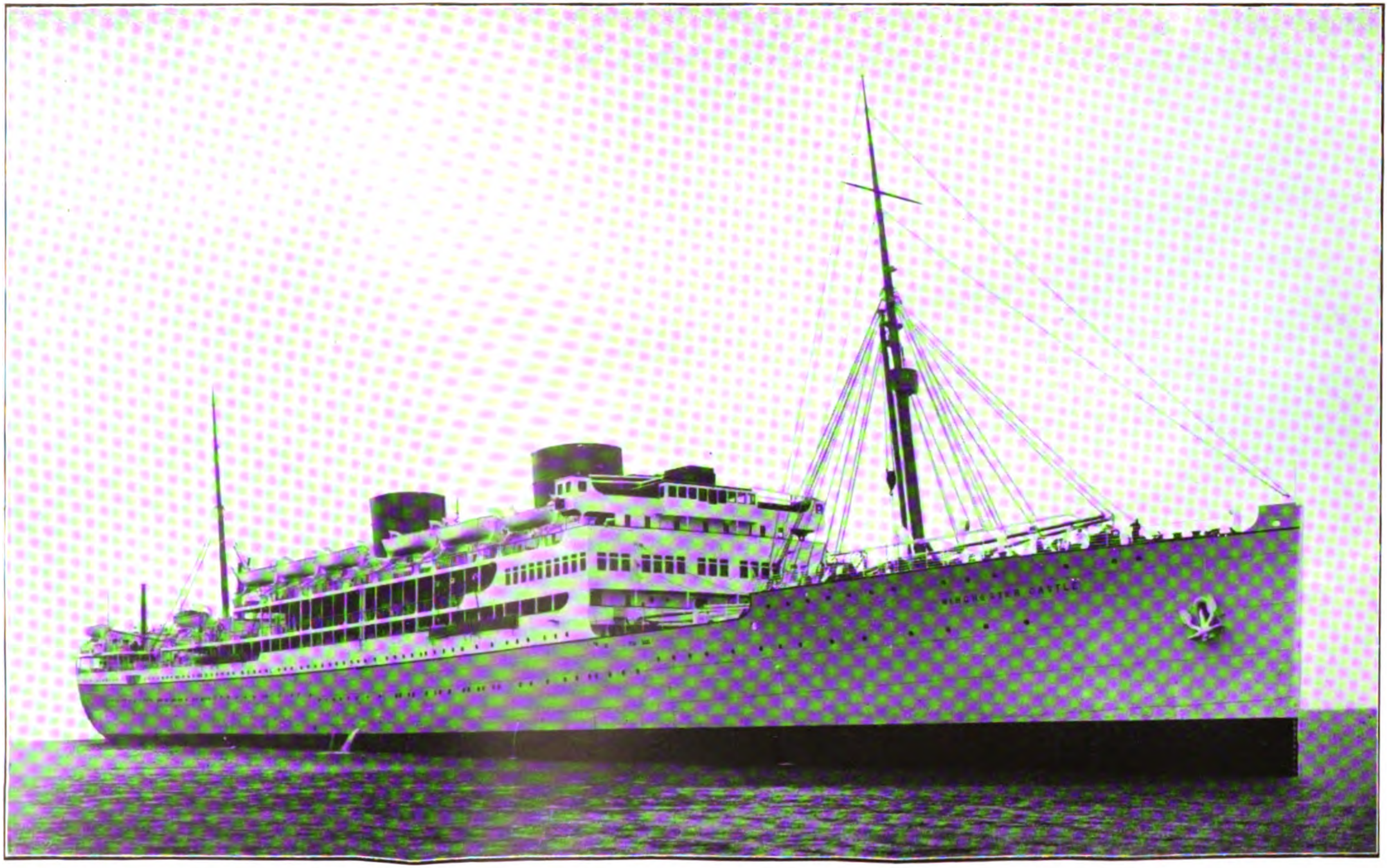
COMMERCE DISORGANISED.

The serious conditions were also described in the 25th annual report of the Baltic and International Maritime Conference, whose headquarters are at Copenhagen. In spite of the fact that 1929 opened rather favourably the year was, the Conference wrote, on the whole, a disappointment to the shipping industry. This was particularly true so far as the larger ships were concerned, but the situation went from bad to worse for all classes of tonnage. The position early in 1930 was described as being probably more gloomy than at any time in the annals of shipping, and there was then no cargo anywhere in the world to be obtained for any size of vessel at rates which covered expenses.

In an endeavour to analyse the causes of the trouble the Conference held that it was largely and " probably solely due to the disturbance in the economic flow of international trade caused by artificial restrictions, not only by the restrictions commonly known as trade barriers but also, and particularly, the disorganisation in the flow of primary commodities which had characterised 1929." Reference was made to the increased crops of grain in Europe which had caused the demand for oversea supplies to be diminished. Although there were more than ample supplies of grain, of sugar, of coal, of steel—in fact of practically all the commodities to be carried—the world's trade was unhinged. All kinds of artificial restrictions on output and distribution had been put into force, the only visible result of which was disorganisation and the crippling of world trade. The statistics available did not, the Conference added, allow of a trustworthy comparison as between world requirements and the volume of tonnage available, but there was no gainsaying the fact that the unsatisfactory position in which the freight markets of the world had time and again been placed during the preceding ten years was practical proof that the supply of shipping was in excess of the demand.

MEETING OF THE BALTIC CONFERENCE.

Nevertheless an attempt was made by Mr. W. A. Souter, in his Presidential address at the annual meeting of the Conference at Copenhagen on May 30, to establish a relationship between the supply of tonnage and the world's commerce. He showed that in 1899 the gross tonnage in the world amounted to 20,878,000 tons, and that the figure in 1914 had risen to 45,404,000 tons and in 1929 to 66,407,000 tons. Of the increase since the War of 21,000,000 tons, representing 46¼ per cent. of the tonnage existing immediately before the War, tanker tonnage was responsible for 5,592,000 tons and tonnage over 25 years old for about 3·3 million tons. Excluding tanker tonnage and tonnage over 25 years old, and deducting two million tons of obsolete American shipping, the increase over the supply before the War was thus about 10·1 million tons. If tonnage of over 25 years old was included, the increase of non-tanker tonnage was 13·4 million tons, an increase of 30·5 million tons. It should be remembered that while tanker tonnage to some extent represents



UNION CASTLE M.S. WINCHESTER CASTLE.

Builders, Messrs. Harland and Wolff, Belfast.)

new trade, owing to the use of oil for motor transport, which has grown greatly, it has largely replaced shipping previously engaged in the transport of coal.

The world's population had, Mr. Souter proceeded, increased from 1,483 millions in 1886 to 1,786 millions in 1913, an increase of 303 millions in 27 years, or 20·4 per cent., whereas the increase in the 15 years from 1913 to 1928 was 154 millions, or 8·6 per cent. The increase of population had thus slowed down since 1913, and this slowing down was due chiefly to the smaller growth of the population of the more highly civilised peoples of Europe, North America, and Australia and New Zealand, whose trade per head of the population was the highest.

It seemed fair to suppose, the President suggested, that the increase in the demand for transport would not slacken in the same way as the growth of the population of the world, for the development of civilisation would tend to promote commerce, even in a stationary population, and it was probably here that the War and its consequences had produced the greatest effect. The growth of the trade of the world from 1913 to 1928 was 17·4 per cent., which was much greater than the increase of 8·6 per cent. in the population, but it was less than the total increased supply of steam and motor tonnage, i.e. 46¼ per cent. during almost the same period. It was also far less than the increase of trade of the world before the War, judging by the figures of trade for the United Kingdom and the United States.

Consequences of the War.

During his 34 years of experience of the shipping trade he had never known, Mr. Souter declared, a depression of such intensity and of such widespread scope as that from which the industry was then suffering. He was told by shipowners of longer experience than his own that the only time they remembered when there was a comparable situation was in 1882–83. That occurred about 12 years after the Franco-Prussian War, while the current depression had occurred nearly 12 years after the Great War. The intensity of that depression could, in his view, be attributed directly and indirectly to the consequences of the Great War. The increase in shipbuilding facilities, both in those countries which previously had a big shipbuilding industry and in other countries which were forced by the preoccupation of the belligerent nations to devote attention to building vessels, was directly attributable to the War. The huge increase in the tonnage of the United States Mercantile Marine was again a direct result of the War, and there had been a big loss in the expansion of trade which might normally have been expected to have taken place since 1914. The impoverishment of the nations and the growth of taxation had reduced the buying power of the peoples, and had prevented the natural expansion of business which would otherwise have taken place.

Then Mr. Souter referred to the greater sense of nationalism throughout the world which, unfortunately, had taken the false direction of causing each country to attempt to make itself self-contained. Agricultural countries now wished to produce their own manufactures, and on the other hand many great industrial countries, particularly in view of their need to make huge external debt payments, were doing their utmost to restrict their imports of food. There was thus the spectacle of a great over-production, or under-consumption, of wheat, maize, sugar, rubber, tea, cotton, and other commodities on the one side, and on the other of millions of unemployed among the industrial nations. It was idle to pretend that all the peoples of the world were adequately fed, clothed and housed, and there was a need for these excess quantities of goods. Trade, however, could be carried on only by the exchange of goods, and it would seem that the processes of exchange had, to some extent, broken down. The legacy of the War was a burden laid on the shoulders of the present and future generations. As with individuals so with nations, the process of restoration could be achieved only by continuous hard work, and yet the world was unable to use to the fullest extent the facilities and opportunities for work which lay ready to hand owing to the want of a flux which would make a complete amalgam. It was evident that there was not full utilisation of the world's gold resources and credit facilities, and they must look to international bankers and financial experts to find a solution of the difficulties under which all were labouring.

The Question of Old Vessels.

Among other questions touched upon by the President was the proposal for the elimination of old and inefficient tonnage, such as that exceeding 25 years old. Such a step would, he maintained, be in line with modern procedure adopted by other industries, and it was one of these processes covered by the term " rationalisation." A scheme of scrapping old vessels could, Mr. Souter pointed out, be worked only on an international basis, and it would be difficult, if not impossible, for the shipping industry to tackle the problem, because of the entirely disproportionate amounts of obsolete tonnage owned by the different maritime nations. He suggested, therefore, that if any definite action was to be taken it should be taken by the shipbuilding industry and on an international basis. Yet it would seem that the shipbuilding industry would have sufficient problems of its own to tackle in view of the various developments of the last few years, such as the effects of the curtailment of warship building, without attempting to make itself responsible for this important problem of old tonnage.

This question of old tonnage is not a new one. It includes the problem involved in the sale of old British ships to foreign owners. The readiness of British owners to replace old and less inefficient vessels by modern ships which can be worked more economically is commendable, and does much to maintain the high standard of the British Mercantile Marine. Frequently foreign owners are prepared to pay higher prices for old ships to be continued in service than could be secured from the shipbreakers, and the higher prices obtained by British owners from foreign firms represent a contribution towards the cost of the new ships. Unfortunately, the old vessels, when bought by foreign owners, are run in competition with the existing and newer ships. The old ships in the control of foreign owners are, the General Council of the Trades Union Congress rightly pointed out in their annual report published in August, worked at very low overhead costs, are manned and provisioned on scales far below those of the British Mercantile Marine, and consequently prove to be formidable competitors in world trade.

The crux of the problem was, it was added, the difference in the price obtained for an old vessel sold for further use and one sold for breaking-up. If, it was argued, this difference could be overcome by forming a compensation pool, or by some other means, this old tonnage would be removed from the seas, the steel industry would obtain scrap, the surplus of tonnage would largely disappear, and stimulation of shipbuilding (one of the best customers of the steel industry) could be reasonably expected. Representations on these lines to the Government resulted in a decision, in September, to appoint a Departmental Committee to examine the question of preventing sales to foreigners. The general feeling in the shipping industry was that any action must be taken by the industry itself, since there have been numerous and costly illustrations of the far-reaching and injurious effects on commerce of the interference by Governments, even though they were inspired by the best intentions.

A Cheerful View.

The annual meeting of Messrs. Furness, Withy and Co. is always held in July, and in view of the company's widespread interests in shipping, its successful results, and the high reputation of its management, the main address at the meeting is always studied with close interest. At the last annual meeting, Sir Frederick Lewis, the chairman, discussed the causes of the shipping depression, and after commenting on the low rates of freights gave instances of increased working expenses. While freight rates then showed a decrease of 22 per cent., expenses represented an increase of from 70 to 75 per cent. on the level ruling in 1913. He also discussed the problem of old tonnage, and suggested that the only remedy appeared to be for owners of old ships who had no special use for them to break them up, rather than keep them laid up at considerable expense waiting for an improvement in freights of which, unfortunately, there was no immediate certainty. A partial difficulty in this procedure would, he admitted, probably be the inability of the market to absorb so large an amount of scrap.

While Sir Frederick did not minimise the troubles which surrounded the shipping industry, which was not alone in having difficulties to solve, he declared that he was not weighed down by existing conditions. On the contrary, he viewed the future with a greater measure of optimism than he had felt for some time. His encouraging outlook was justified by the belief that existing conditions were part of the stage setting for the trade revival which would come as surely as anything it was possible to predict. It would come, he declared, as far as shipping was concerned, because oversea trade had constantly developed and expanded ever since the nations of the world first began to trade together, and there was not yet known any method by which the oversea trade of the world could be conducted as efficiently and as cheaply as by shipping. The speech came at a time when encouragement was badly wanted by all concerned in the shipping industry, and it acted as a tonic.

Freight Recovery in the Autumn.

Actually at the time of the holding of the meeting there were signs of some slight improvement in the volume of trade for cargo shipping. The index number of the Chamber of Shipping for June, as recorded earlier in this article, had risen a little above the appallingly low point reached in May. The recovery was, however, only an indication that bedrock had been reached. Hence, when in some oversea markets there sprang up a little demand for cargo space, the markets were denuded of tonnage owing to the laying-up in home ports of so vast an amount of shipping for which previously there had been no employment. Owners who happened to possess tonnage available oversea were able to secure better rates, which provided some slight compensation for the losses they had incurred while vessels were being kept oversea waiting for cargoes. One of the markets to revive was the River Plate grain trade. When the homeward rate from the up-river ports of the Plate to Europe had fallen to the basis of only 10*s.* a ton, the outward rates for coal from this country had advanced to about 17*s.* a ton, since owners had to be tempted to dispatch their ships to a destination where the prospects for remunerative employment homewards were very uncertain.

Again, the speculative character of cargo shipping was demonstrated. With increased shipments of grain from the River Plate the need for vessels developed, and it happened that some of those owners who had dispatched their ships to the River Plate at high rates were in time to secure the better grain freights homewards, such as 17*s.* or 18*s.* a ton. Very soon the larger volume of employment offered in the homeward trade attracted vessels to South America, and, by the end of August, while the rate for grain homewards had advanced to about 20*s.* a ton, the outward rate for coal from South Wales to Buenos Aires had fallen to 11*s.* a ton. During July, August, and September the volume of employment in the homeward trades developed subject to occasional periods of hesitation and setbacks. A marked rise in the rates was encouraged by the scarcity of tonnage oversea, and the comparatively few vessels which happened to be available oversea for early loading secured the best rates.

European Grain Requirements.

Nevertheless inquiry for vessels to load at later dates developed. The reasons included a diminution in the European harvests as compared with the exceptionally fine harvests gathered in the autumn of 1929. It became apparent that Europe would have to import on a very much larger scale than in the previous year. A further factor was that much damage by drought had been done to the corn crop in the United States, and the grain markets and freight markets were affected by the consideration that that country would need to import grain or maize from South America and South Africa.

A feature of the freight markets in the late summer and early autumn was the chartering of a large amount of shipping to load grain in the ports of the Black Sea and the River Danube. The volume of business done on account of the Black Sea was much larger than any undertaken since before the War. It was not of entire advantage to the British shipping industry, since the voyage from the Black Sea to northern Continental ports is short in comparison with some of the trades which have figured very largely in the freight markets during the last few years, and it is a route in which Greek and Italian vessels participated largely before the War and for which they were again freely chartered in the late summer and in the autumn of 1930.

Yet, within the space of a few weeks, a more hopeful view prevailed in the freight markets than had obtained during the first depressing six months of the year. Australia showed herself ready to ship portions of the remainder of her 1929 wheat crop and to make arrangements for the transport of part of her 1930 harvest. A development of chartering in the autumn is customary, and the revival of the late summer and autumn of 1930 was at least as welcome as any recovery which had ever previously taken place. Unfortunately the improvement was not maintained, and in October markets were once more severely depressed. The substantial shipments of grain from Russia contributed to big declines in prices, and restricted buying and shipments from other countries. In any case the temporary expansion had come too late for the year to be other than highly unsatisfactory for owners. The cargo liner companies were hard hit in 1930 by a decline in the export of manufactures, and better times for them are badly needed. Their business is usually regarded as less speculative than that of the owners of ordinary cargo vessels. They cannot hope to enjoy the benefit of the sharp rises in rates which have sometimes in the past (but not for years) helped to provide part compensation to owners of ordinary cargo vessels for previous very low rates. The liner companies can at best hope to try to maintain an even tenor in the course of their business. Last year, owing to a variety of causes, including troubles in India, the Far East, and Australia, their experience was much below the normal. It is greatly to be hoped that the low stocks of goods which are known to exist in many parts of the world will enable the holds of the ships providing regular services to be filled once more in 1931.

CUTHBERT MAUGHAN.

CHAPTER XIV.

THE OCEAN TOURIST.

In writing of shipping and the tourist business the first difficulty is that of defining a tourist, because, although the word has come to be regarded as representing a certain type of traveller—possibly one who goes for a round of pleasure or amusement as against one who, for business or family reasons, uses the ocean services as a means to an end—shipowners cater for the tourist in such a variety of ways that his identity is lost the moment he approaches one of the many booking agencies or the offices of the shipping companies themselves. If he travels as an ordinary first-, second-, or third-class passenger on a regular itinerary the tourist becomes merged in the general crowd. Even should he elect to travel "tourist-third" he is not branded as a mere wayfarer, since the tourist-third class merely indicates a definite standard of comfort on board the ship in which he chooses to travel. He may, on such an occasion, find a majority of his companions bent on the same pleasant errand as himself, and, no doubt, in its initial stages the tourist-third business sprang from an effort by the steamship lines to encourage those of moderate means to wander afield.

The traveller may choose to embark on a ship specially appointed for pleasure cruising, one whose itineraries are planned entirely because of the sights which are regarded as fitting for pleasure and enjoyment, and all the arrangements are such as to engender a holiday spirit. He need not, however, confine himself to such voyages, for, in the desire to encourage travel, facilities are offered by the shipping companies to those who wish to make short journeys by vessels which traverse thousands of miles between their terminal ports. Thus the tourist may make a short trip, say, from London or Liverpool or Southampton to Marseilles in a ship bound for India, Australia, or the Far East, and, in so electing, he has the choice of ships of all kinds and nationalities. The cost will be in the region of £22 first-class and £16 second-class; or even as little as £9 if he is content to travel in the third-class cabin. He may go farther afield on the same itinerary, returning by the first convenient ship of the same or an associated company. On the other hand, he may take an ordinary ticket to Quebec or Montreal and include a 2½ days' journey up the St. Lawrence. If the southern hemisphere is more to his liking, there is a run across the South Atlantic with a thousand miles up the River Amazon. There are the ordinary passages to Rio on the one side and Cape Town on the other. There is the Panama Canal, opening up the Pacific.

In effect, there are all the shipping services at his disposal. For short runs the Norwegian Fjords are among the most popular. They can be seen within the space of an ordinary two or three weeks' holiday. The shipowner finds them a useful outlet for ships which can, for seasonal reasons, be spared from their regular runs. There are ships carrying all classes, others carrying only *de luxe* passengers, and a few which are exclusively tourist-third. The business stimulated by American desire to see Europe has been developed on its reverse side, and Britons are urged to see America and Canada in comfort for something like £30 return. A large passenger line operating on the North Atlantic has advertised the appointment of a French chef for its third-class passengers. Its latest ship has hot and cold running water in the third-class cabins, and many of them are spacious two-berth rooms with ample wardrobe accommodation. The third class is no longer an emigrant class.

In developing the purely tourist business, shipowners have gone so far as to build special ships, often of large tonnage, and their managements must keep them running profitably throughout the year. Those who seek to attract the cream of this business know from experience that travellers are very exacting in their requirements—and they have reason to be so, since the cost of a world cruise may easily involve the expenditure of several hundred pounds for a single person, even if he does not take a luxury suite. The public therefore have grown accustomed to expect as a right in such vessels a large swimming bath, the redistribution of the deck space to provide adequate tennis courts and facilities for other games, sun decks for the development of the Lido tan, and many other refinements. There are some agencies which stipulate that there shall be a large proportion of single-berth cabins, and that not more than two passengers shall be carried in one state room, except for family reasons and at the special request of the travellers themselves. At least one of the large public rooms must have a proper dancing floor, and supplementary dancing facilities must be provided on deck under conditions of appropriately attractive illumination. Where there is only one orchestra its strains must be relayed electrically to other parts of the vessel. Ships of 20,000 tons with only a third of their normal passenger capacity occupied—this being the usual latitude for cruising—have many spots which would be hollow, cold, and inhospitable but for the installation of loud speakers.

A typical "round-the-world" cruise includes first-class passage with state room accommodation—graded according to the fare paid—and landing and embarkation charges at the different ports of call. Shore excursions are also covered, with certain limitations; that is to say, a full range of shore excursions is included, but for those who wish to make a more decisive breakaway there are other shore attractions at a supplementary charge. Where the ordinary shore excursions involve stays of, say, a day or so, hotel accommodation and meals are provided. It depends upon the nature of the cruise what type of hotel is offered, but on the *de luxe* cruises only the very best is good enough. Entrance fees and gratuities, and the services of guides and interpreters, are included in the fare.

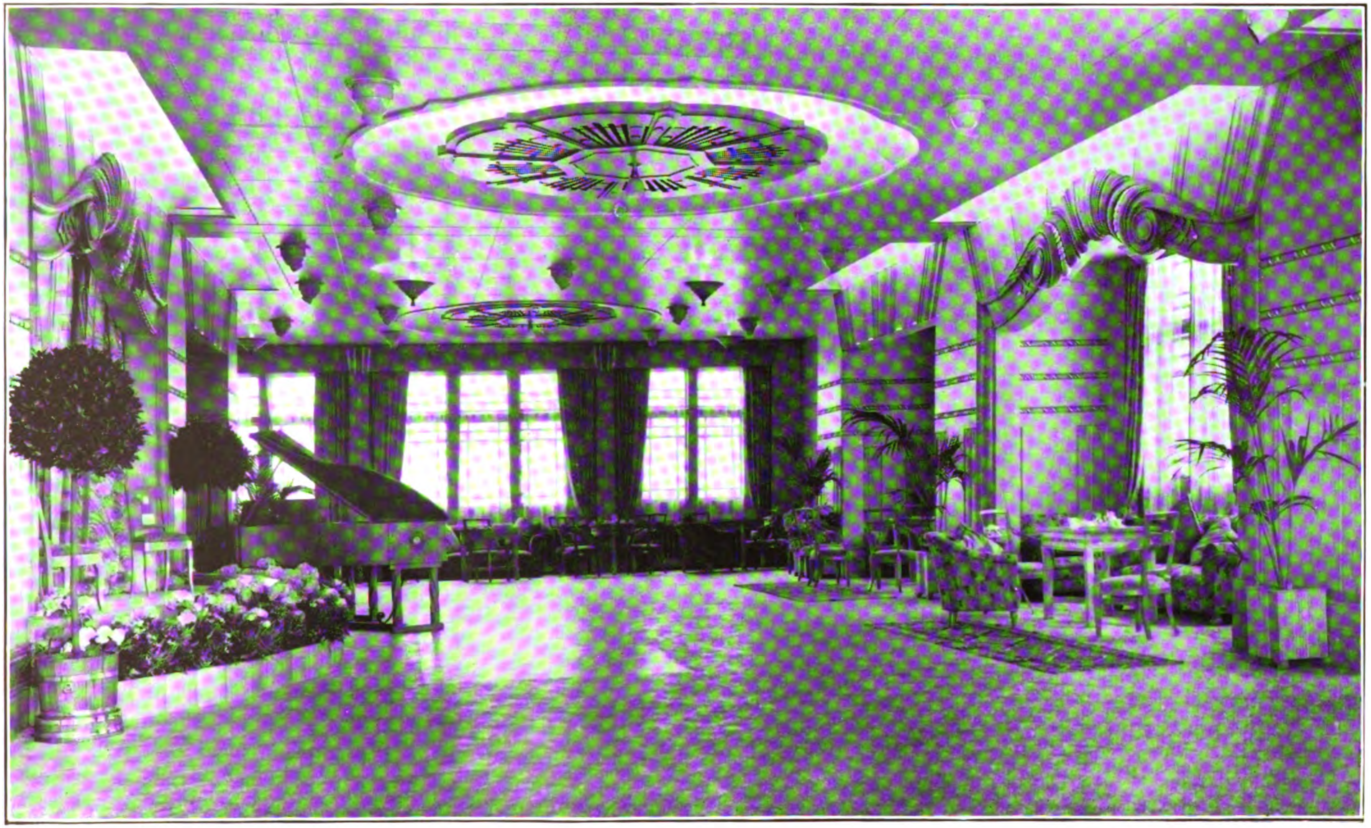
One extensive cruise running during the winter of 1930–31 extends for 163 days, 97 of which are spent at sea and 66 in port. The number of miles covered, exclusive of shore excursions, is 37,046. The only items not covered by the passage money—the minimum is £448—are personal items such as beverages "not ordinarily served on board and at hotels," laundry, baggage insurance, passport and *visées*, private bathrooms at hotels, conveyances or guides specially required by members on individual excursions and not ordered by the cruise director, and gratuities to stewards on board the ship.

There is always a special bureau for those responsible for the shore arrangements, and the ship will have all the facilities of the modern hotel, such as stenographer, barber, ladies' hairdresser, manicurist, masseur, masseuse, surgeon, professional nurses, laundry, valet service, photographer, novelty shop, supply of newspapers and periodicals, and, above all, constant communication by wireless with the outside world, whether for business or for pleasure.

Special attention is paid to the photographic department, and rightly so, since a plethora of good snapshots handed round to admiring—and envious—friends is not only an excellent advertisement but a free insurance policy for the success of the next trip. Consequently a staff of photographic experts may be carried. These will offer advice to the amateur, and in the developing and printing of films coax the best results from indifferent material. Generally, however, the light conditions are ideal both at sea and ashore, and results are achieved which could not be obtained at home. Striking snapshots of, say, Egyptian scenes, or the sports pictures taken on the games decks persuade the amateur that he has really come into his own.

On all these cruises banking facilities are provided in varying degrees of completeness. Some shipping companies, like the P. & O. and Canadian Pacific, and tourist agencies, like Messrs. Thomas Cook and Son and the American Express, can provide in the fullest measure from within their own organisations. Others have the international resources of the big banks at their command, and the traveller need not carry a belt of sovereigns for the needs of the cruise. So, whether the process is one of following the path of the sun, seeing the Isles of the Blest, or whatever allurements the passenger and publicity managers may designate it, no detail is now omitted to overcome a sense of boredom or loneliness. Indeed, the complaint is sometimes the other way.

A typical full-scale winter pleasure cruise may provide for 3 days in Quebec, 3½ days in New York, Christmas in the Holy Land, with inclusive excursions to Jerusalem and Bethlehem, New Year's Eve in Cairo, 7½ days in India—with visits to Delhi, Agra, the Taj Mahal and Fatehpur Sikri—4½ days in Ceylon, 3½ days in Java, 10 days in China, 8½ days in Japan, 3 days in Honolulu, Hilo-Hawaii, and the rest ; and back *via* San Francisco, the Panama Canal, Havana, and New York, until Southampton is reached once more in the early spring. The fortunate voyager would have also peeped in at Madeira, Gibraltar, Algiers, Monte Carlo, Naples, Athens, and Haifa as a sort of *hors d'œuvre* to the real business of the cruise, and, *en*



PALM COURT OF CANADIAN PACIFIC S.S. EMPRESS OF JAPAN.

route, have found a tactful master of ceremonies to break down the initial shyness of passengers and to encourage healthful deck games and exercises which counteract the effect of a superabundance of good fare on an appetite whetted by the keenness of the sea air. He would have had only one companion in his state room, unless at special request, or he might have enjoyed the privacy of one of the many single-berth cabins if he had elected to pay the higher rate naturally charged. On motor-car drives he would have found that the rule was to place four passengers in a seven-seater car and three passengers in a five-seater.

Cruises have become popularised to an enormous extent. It is doubtful whether those who originated them ever conceived of the possibility of large numbers of people following the sea in such luxury, or guessed that from humble beginnings, a sort of part-time occupation for ships during the off-season, they would develop into a highly specialised business. One tourist organisation scheduled between April and December, 1930, no fewer than 112 cruises ranging in duration from 12 days to 45 days, and in cost from £14 to £165. The tourist business has settled down to be a livelihood for thousands, and in its widely embracing organisations has risen to something like the dignity of an industry. History teaches that once the initial success is won hard competition sets in, and the cruise business is no exception. There are signs that it may be overdone, and its promoters may easily fall victims to the vicissitudes of fortune. The American Stock Exchange slump of 1929 involved one prominent agency in immediate cancellations of 50 per cent. of its bookings, and there was only a small proportion of rebooking later. The same slump led to cancellation of the charters of several large passenger ships, and there would have been more but for legal and commercial obstacles. The industrial depression of 1930 led to other cancellations last winter. After all the luxury cruise is a luxury cruise.

The keen competition for business has led to the world being scoured for novelty. A visit to the lonely island of Tristan da Cunha is no longer an outstanding event. The crossing of the Sahara and a fleeting visit to Timbuctoo in fast cars, more like glorified caterpillar tractors, have passed into the realms of everyday practice, and have become not very different from catching the business train with a season ticket in one's pocket. The winter of 1930 provided a tour to the Antarctic with a look in on the whaling fleets, and the possibility of getting within 700 miles of the South Pole. The seven wonders of the world are insufficient to ensure that a single passenger agent could hold down his job. The novelty of to-day is taken in to-morrow's stride.

Old ships have been converted exclusively for cruising, and newer ships have been altered at the cost of hundreds of thousands of pounds. Even these measures have not sufficed, and ships have been built specially for cruising purposes. No feature is omitted to attract business. On one hand the motorship is proclaimed as the last word in naval architecture, and thus the public are educated as regards not only the places they visit, and the character and size of the ship which conveys them, but also the machinery by which it is propelled. Praise of the turbine or turbo-electric vessel for its smoothness and freedom from vibration offers a challenge to the oil engine and the older steam reciprocating engine, and the attention of the passenger is drawn to details which he has hitherto looked upon with indifference or possibly regarded as lying outside his ken and certainly beyond his control. One company will advertise the best mechanical ventilation, and another the fact that there are no inside cabins and that every room has a porthole opening directly to the air. Thus, insidiously, is the traveller taught some of the elements of marine engineering and naval architecture, and of personal comfort at sea—not expensively at the cost of perhaps a couple of pounds a day.

Shipping companies are finding that the public will no longer submit to being herded promiscuously four in a four-berth cabin, and there is a definite swing towards single-berth cabins for unaccompanied passengers. It has always been difficult to see why, in order to conform with the shipowners' peculiar economics, the passenger should accept a standard of privacy below that of the meanest of hotels ashore, while being asked to believe he was getting first-class accommodation. The third class have revolted at the accommodation offered twenty years ago, and first-class requirements have altered too. For this change the pleasure cruise is no doubt responsible to some extent. It has instituted a new standard of living on board ship, and the competition of the various companies will extend in two directions. One is a higher degree of comfort, which is almost impossible on some ships, and a greater degree of novelty which, for reasons already given, is nearly as difficult. The other is the familiar competitive device of lowering the price to the customer. But to this process there is obviously a limit, and with continued reduction in fares the time must come when, even with a full ship, the owner will be unable to earn a reasonable profit on his outlay, or even cover his working expenses.

The tourist business has reacted on the general business of the shipowner, and the problems of the one are closely related to those of the other. The shipping companies have undoubtedly stimulated the desire to travel afloat, and the passenger is not left to his own devices once he has paid his money and come aboard. When it is considered how not long before the War only a few short trips and one or two longer cruises were available, the magnitude of the tourist traffic to-day stands out as one of the most remarkable of all the efforts made to open up new avenues of business.

VIATOR.

CHAPTER XV.

THE LINER AS AN HOTEL.

SHIPS offer interest according to the outlook of the observer. Naval architects judge their merits by their ability to meet the requirements of the owners with regard to speed, consumption of fuel, deadweight, and stability. Owners appraise them by their popularity with the travelling public, by their steadiness at sea and by their running costs. The general public show a tendency to favour ships according to the number of funnels they possess. In some way the suggestion of power and speed which is allied with, say, a three-funnelled arrangement has an appeal to some would-be travellers that shipowning companies cannot afford to despise.

The majority of passengers are influenced in their choice of a vessel by four factors—its nationality, its size, its speed, and, not unusually, by the cost of the trip.

At the present time, on the Atlantic service, ships of the largest and fastest type are available, belonging to American, British, French, German, and Italian companies. It is not unnatural therefore, that, other things being equal, the nationality of a voyager will have some weight in his choice of a ship. So far as the excellence of the accommodation is concerned, it may be taken for granted that each line vies with another in providing all that can be desired, though it has been averred that cleanliness is not always the distinguishing feature of some of the great ships belonging to other than British lines.

THE CALL OF SIZE AND SPEED.

Size and speed have a call which cannot be disregarded. The fairly regular traveller across the Atlantic does not consider his experiences complete unless he has voyaged in the latest liner, while the tourist who is making the trip of his life desires to have that in the fastest of the group. A large proportion of Atlantic passengers are of the latter type, and this fact induces shipowners to build vessels of enormous size, of high speed, and accordingly of great cost.

When money considerations are a deciding factor in the choice of a ship, an intending traveller finds that to travel first-class in a giant liner costs much more than to make the trip in a ship of more moderate size and speed. He is thus faced with the option of travelling in a lower class in a vessel of the first order, or having first-class accommodation in a slower and smaller ship. When time is no object, or when the call of size and speed has no appeal, it may be found advisable to adopt the latter course, and there are several ships of the smaller and slower class which are firm favourites with regular Atlantic travellers.

In the evolution of the Atlantic liner the real and imaginary requirements of travellers are being met in every conceivable way. Some voyagers, indeed, complain that the elaboration in the standard of accommodation now offered is taking away the feeling that one is on board ship. They say that in the old days the cabins and public rooms were so radically different from the bedrooms and public rooms on shore that an immediate sense of anticipation was aroused when foot was set on board ship. Now the staterooms are commodious, the sanitary arrangements are admirable, and the magnificently appointed apartments set apart for the social life of those on board vie with the best that can be found in any hotel ashore. Although this feeling may be experienced by some, it is evidently the case that there is a travelling public that wants the elaboration which is now common. If this is not so, clearly owners have failed to judge the public taste. for each new liner outstrips its predecessor in the beauty of the public rooms and the roominess and comfort of the private cabins.

When a passenger embarks on a modern liner he finds himself in an entrance hall which extends the full width of the ship. This is usually placed on the lowest first-class passenger deck. From this entrance hall ascends the main stairways which lead to the various decks. Lifts are available to convey the passenger and his luggage to the particular deck on which his cabin is situated. Since first impressions are lasting it is desirable that the entrance hall, stairways, lifts, and corridors should be spacious, and the latest practice meets this requirement. Firms that specialise in the decoration of the public rooms of ships are given the contracts to panel and furnish the entrance halls and staircases, while the latest types of elevators are installed with the best of safety devices.

Cabin Accommodation.

It has been said with regard to certain liners that the cabin accommodation falls far short of the standard set by the public rooms. This criticism, though not without foundation, is not justified by the latest practice. In a modern liner of the highest standard the passenger finds himself allotted a room of probably 200 sq. ft. in area, shared, unless arranged otherwise, by only one other passenger. It is now the aim of owners to make better provision for the desire for privacy than was formerly the case. Accordingly rooms are now allocated to either one or two persons, the two-berth cabins being, naturally, of greater size than those having single berths. Private bathrooms are so arranged that at the most three persons may have access to them—the occupant of the single-berth cabin and those in the two-berth room adjoining.

The cabins are furnished in a manner to meet the most exacting tastes. In the latest practice veneered bulkheading forms the boundaries of the room, the ceiling overhead is neatly panelled, and the floor is laid with linoleum covered by a heavy pile carpet. A large sidelight affords natural light and ventilation to the room. Single cot beds take the place of the double-tier berths formerly common in first-class cabins. These are furnished with the latest type of wire-spring mattresses, the bed linen is spotless, and down quilts are supplied to each bed. At a convenient point a settee is placed, and an easy-chair and armchair furnish the sitting arrangements. A table of neat design, harmonising with the basic veneer of the cabin, is supplied. The room is further furnished with a dressing-table of artistic design and sound quality, with a large wardrobe for each occupant, with a large wall mirror, and with a basin having running hot and cold water laid on. Bedside tables are also provided, and fixtures are arranged for accommodating the modern cabin trunks which are becoming a common part of the equipment of travellers. This briefly indicates the furnishings of the cabins.

The passenger finds at his command a number of switches which control the lights in the cabin, and bell pushes which secure the immediate attendance of the steward allotted to his section. Ornamental ceiling and wall lighting forms one of the features of the stateroom, and these lights are generally controlled from each bed and entrance door. A light is fitted over each bed controlled by a switch, the dolly of which is made luminous so that it may be seen in the dark.

Beside each bed may be found two bell pushes, one red to call a steward, and the other green to summon a stewardess. Upon one of these pushes being pressed a buzzer rings in the deck pantry, while a corresponding coloured lamp lights in the passageway immediately adjacent to the door, another at the end of the fore and aft passageway, and yet another in the deck pantry. The steward, or stewardess, is enabled to locate the call by following the lamps, all of which are extinguished when the call is answered.

In some ships each first-class cabin is fitted with a telephone, but many passengers would prefer to miss this feature of modern ship equipment, especially when, as in some cases, it provides communication from mid-ocean with the shore. In the cabins of some up-to-date vessels there are timepieces, electrically controlled from a master-clock.

A passenger will not be long in his cabin before his attention will be drawn to the means at his disposal for regulating the temperature of the apartment. Fortunately this is now accomplished by a continuous supply of fresh air. Modern ventilation consists in leading fresh air along light sheet steel trunks to every cabin and public room in the ship. All that the passenger is aware of is that a circular louvre is discharging air from the ceiling into his cabin. This air is heated before reaching its destination, but, by an ingenious arrangement, the degree of warmth desired by the occupant can be regulated to suit his requirements. The dispersal of this fresh air, so as to obviate direct currents which might be objectionable, can also be effected.

In addition to this means of supplying fresh air and warmth to a cabin, it is frequently the custom to furnish an electric fan for putting the air in motion should the weather be very hot, and an electric radiator should the temperature be the other extreme.

Adjoining the cabin the passenger finds a private bathroom, which is fitted with all the latest sanitary appliances. A beautiful bath of earthenware, or of cast iron porcelain-enamelled, is fitted with supplies of hot and cold sea-water and perhaps also of hot and cold fresh water. Overhead is a shower with the same water supplies. A washbasin and watercloset complete the sanitary fittings. The floor is neatly laid either with marble mosaic or with a sheeting of rubber. The walls may be tiled, or panelled with plywood having a facing of marble or alabaster. With their equipment of mirrors and various mountings these bathrooms are most attractive.

Before a passenger seeks to associate with those on board the attention of a hairdresser may be desired. In all modern liners there are barber's shops, beauty parlours, and manicurist rooms available for the different classes of passengers. These are furnished with the latest appliances, and are a very necessary feature of modern liner equipment.

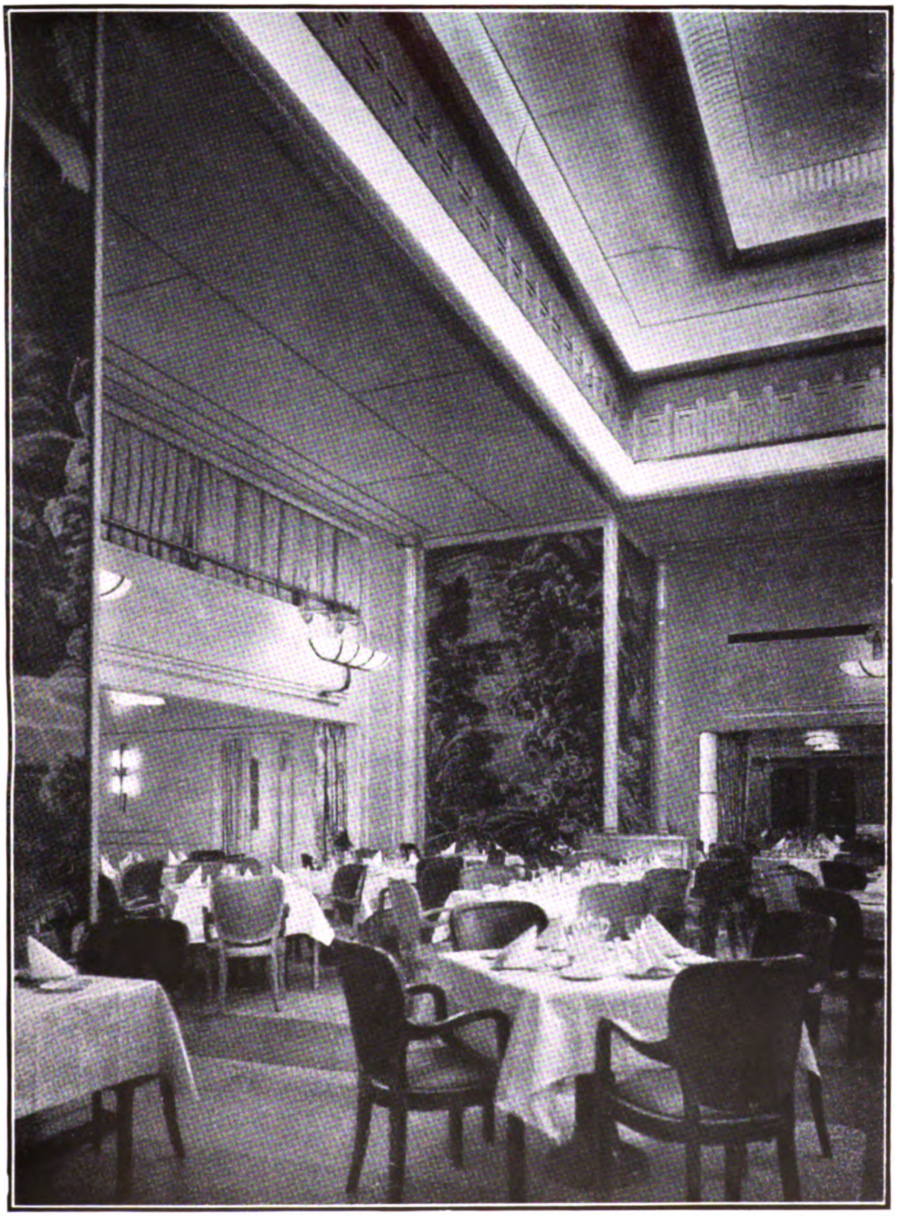
Dining Facilities.

Having completed his or her toilet the passenger, in all probability, makes early acquaintance with the dining saloon. This, usually the most spacious apartment in a liner, is generally placed on the lowest passenger deck, slightly forward of midships. In the Bremen the length of the dining saloon is 88 ft. and the breadth 101 ft. Extending through two decks, it is almost 17 ft. high. Such noble proportions enable the architects to whom the design is entrusted to produce wonderfully effective and striking results. Efforts are made to avoid pillars in order to secure wide, open spaces, and this result is obtained by the introduction of strong beams which are hidden by the architectural features overhead. This apartment affords magnificent scope for a judicious selection of panelling materials and also for electric lighting effects. When the tables are laid the general appearance is one that meets the most fastidious of tastes.

The food provided on board ship rivals in excellence that to be obtained in the best of hotels on shore. Huge quantities of provisions stock the storerooms adjacent to the galleys, and modern refrigerating plant keeps these in admirable condition until required for use.

The passenger is served by a steward who makes frequent visits to the serving pantries at the end of the dining saloon. Hidden from view are the extensive galleys where the food is prepared. So important a feature of ship equipment is the cooking apparatus that some indication must be given of the plant installed.

Cooking ranges about 12 ft. in length and 6 ft. 6 in. in width, heated either by oil burners or by electricity, form the most important part of the equipment. These ranges have ovens on each side, made of heavy sheet steel and fitted with runners, shelves, and strong roasting pans with gratings. Each range has a polished mild-steel



DINING SALOON OF NORDDEUTSCHE LLOYD S.S. BREMEN.

top plate, and also cast-iron hot hearth and cast-iron boiling panels as required. Charcoal-burning grills constructed of heavy wrought-iron plates and lined with white enamelled tiles, electric fish fryers, hot closets, hot presses and carving tables, bains maries, salamanders and toasters, meat-mincing machines, vegetable ovens, cooking boilers, and many other appliances are included in the galley gear. In the bakery are electric ovens for baking bread, an electric oven for confectionery, a bread prover, dough-mixing machines, roll-making machine, bread slicer, ice cream making plant, etc. Not only is there a concentration of cooking appliances in this part of the ship, but in various quarters service pantries are provided from which hot food can be supplied when required by the passengers.

Adjoining the main dining saloon private dining-rooms are now being arranged. These apartments partake of the architectural features of the adjoining saloon. In several liners an extensive foyer is provided which accommodates diners when a vessel is carrying a greater number of passengers than can be seated in the main saloon.

Public Rooms.

After having been served to his satisfaction the passenger finds his way to the group of rooms set apart for the social life of those on board. From the entrance hall adjoining the dining saloon flights of stairs lead upwards to the various decks and also downwards to the swimming bath and gymnasium spaces. These stairways receive special treatment from the hands of the decorative contractors. They are spacious and have an easy rise. Ornamental metal balustrading is used largely, and frequently the staircases are arranged to wind round the lifts which serve the various decks. Specially selected woods are used for the panelling, and rubber treads and flooring are fitted on the steps and landings. At each deck couches and easy-chairs are placed, while the inquiry offices and shops are grouped around these entrance halls.

On the public room deck long and wide galleries link up the various rooms. In some vessels, such as the Aquitania, these are a special feature of the internal arrangement. Beautifully and comfortably furnished and brilliantly lighted, they provide inviting approaches to the several public apartments which form the chief attraction on board ship.

One of the features of modern liner arrangements is the large promenading spaces afforded. For long stretches these are protected from the wind by screen windows, so that in all kinds of weather the pleasures of the open air can be enjoyed. In certain ships portions of these spaces are set apart as palm courts and garden lounges. Trellis-work is adopted for the treatment of these spaces, plants and palms of all kinds form the adornment, and basket chairs and settees provide the sitting accommodation.

Swinging or revolving doors lead from these apartments to the interior rooms, chief of which is the lounge. This room is subjected to various methods of treatment according to the ideas of the artist responsible for its decoration. In the new Empress of Britain the lounge has been designed by Sir Charles Allom, and the French walnut panelling, marble pilasters, and rich bronze ornaments recall the Renaissance. The curtains are of fine silk damask and the furnishings of the rarest distinction. The large area and great height of the lounge afford the artist wide scope for his genius, and the craftsmen have great opportunities for the display of their skill. Beautiful carpets cover the floors, exquisite furniture fills the room, and from hidden sources the space is flooded with light.

First favourite with the seasoned male passenger is the smoking-room. In many ships this apartment is designed on the lines of some old-time inn. Large open fireplaces are common, and wooden rafters overhead, heavy oak furniture, and electric fittings to represent innumerable candles reproduce the atmosphere of the inn. A delicate scheme of Chinese decoration is being adopted in the Empress of Britain, with exquisite woodwork, a lovely fireplace of green and gold tiles, and lighting hidden in tall porcelain vases. No smoking-room is complete without its complement of comfortable chairs and inviting settees, and tables for card games complete its furnishings.

Dancing is a nightly pastime on board ship, and the latest liners make ample provision for its devotees. Large rooms with magnificent floors and entrancing lighting effects are set apart as ballrooms. Ceilings and walls are beautifully treated, and richly upholstered furniture surrounds the floor.

For the studious libraries are provided, and in the quietude of the writing-rooms correspondence can be undertaken. For the children there are nurseries, on the walls of which are depicted the fairy tales which have enthralled the young since the beginning of time. For the adults cocktail bars are an attraction which is a relatively new feature on board ship.

Generous provision is made for lovers of sport. Open air tennis courts of full size for doubles, racquet courts suitable for championship matches, and well-equipped gynnasiums are usual features in large liners. One of the chief attractions is the swimming bath. This is usually a most inviting region, with spectators' gallery and massive columns surrounding the pool. In one such pool water comes continuously from a monster turtle fashioned of terazzo glass, and perpetual daylight is afforded by hidden lamps with brilliant flood-lights under the water. Turkish and electric baths adjacent to the swimming bath complete the group.

The Mechanical Side.

From this very incomplete description of the amenities on board ship it may be gathered that everything that can be desired by the traveller in the direction of comfort, sport, and social intercourse is provided for, and all that can be offered by hotel life ashore is afforded in abundant measure. There is, however, an amazing difference in conditions. Hotels are static objects, the only life exhibited in them being that of their tenants. A ship, however, is pulsating with energy.

When seated in one of the large rooms in a modern leviathan it is difficult at times to realise that one is on board a ship thrashing its way through the seas at a speed of 20 or 25 knots. A walk aft to the region of the screws soon dispels this illusion. Great tracks of white surging foam tell of the mighty power being developed somewhere in the bowels ot the ship. Thousands of tons of potential energy in the shape of oil fuel are carried in its tanks, and this is drawn from constantly to fire the high-pressure boilers which supply the powerful turbines with steam, or, in a motor ship, to feed the oil engines. Gone are the days of the firemen toiling in veritable hells, for the spraying jets of oil are constant in their feed and untiring in their duty.

Aft of the boiler rooms the whirl of the turbines denotes that many thousand horse-power is being developed to speed the great ship on her way. Watchful engineers observe any variation in the constancy of the revolutions of the shafts, and with the greatest degree of certainty the ship traverses her way.

Apart from the propelling machinery other powerful units are in constant action, such as electric generating plant of a power equal to that necessary for the lighting of a small city, and the refrigerating machinery needed to keep the food in perfect condition. Numerous pumps, ceaseless in operation, maintain the sanitary services and supply the boilers with the water necessary for raising steam. Failure in operation of any of these machines is of very rare occurrence, and because of the almost perfect action of this machinery travellers are inclined to forget that beneath their cabins and their social halls and playgrounds are the untiring instruments of one hundred years of engineering science.

Although it has been impressed upon man, by dire illustration, that the unsinkable ship has yet to be built, travel by sea is infinitely safer than by any other means. Further, should an accident befall a liner the appliances available for calling assistance and also for securing safety are now of the most efficient type. The chances of lifeboats being requisitioned are infinitesimal, but the knowledge that the life-saving appliances are efficient adds to the peace of mind of voyagers.

The modern liner is, perhaps, the greatest thing that man creates, and in it the traveller can find the most desirable features of hotel life allied to the wonderful experience of associating himself with the "life" of the ship and the self-contained community it constitutes.

COMPRADOR.

CHAPTER XVI.

LOAD LINE CONVENTION.

IN last year's issue of "Brassey's Annual," the history of the marking of load lines on the sides of merchant ships for the purpose of regulating the depth to which they can be loaded with safety was reviewed from the earliest times to the publication of the Report, in August, 1929, of the Load Line Committee appointed by the Board of Trade in February, 1927. The Report contained new Rules for Determining the Maximum Load Lines of Merchant Ships, including conditions under which loading deeper than hitherto allowed could be permitted in the case of tankers and of steamers carrying deck cargoes of timber. These Rules were formulated after an exhaustive investigation into the record of shipping casualties, the experience gained by the authorities entrusted with the assignment of load lines to merchant ships, and the experience gained by shipowners, master mariners and others of the operation of ships and of their behaviour at sea. In addition, careful consideration was given to the progressive developments in the design, construction and equipment of cargo ships since 1906, when the Rules at present in operation were adopted by the Board of Trade. The Committee recommended that the new Rules could properly be adopted by the Department and applied to British ships.

INTERNATIONAL AGREEMENT.

In making this recommendation, however, the Committee suggested that adoption should be postponed until an International Conference had been convened with the object of obtaining international agreement not only on a set of rules for fixing the position of load lines, but also on the uniform application of such rules and on the necessary arrangements for preventing the contravention of the rules by overloading or any other means.

This question of international agreement had occupied the attention of the shipping industry for some years, and its desirability had been consistently urged at successive meetings, since 1921, of the International Shipping Conference (convened by the Chamber of Shipping of the United Kingdom), consisting of shipowners and their advisers from the principal maritime countries. The Board of Trade were not only in complete sympathy with the movement, but had kept the object of obtaining international agreement steadily in view since 1906, when foreign ships loading in British ports were required by the Merchant Shipping Act, 1906, to load in accordance with the British Rules. The Board had, moreover, encouraged other maritime nations to enact laws for the compulsory marking of load lines on ships and, for this purpose, to frame rules similar to the British rules for fixing the positions of those lines. Provision was made in the Merchant Shipping (Load Line) Act, 1890—now embodied in the Merchant Shipping Act, 1894—for the recognition, by Order in Council, of the validity of the load lines of ships belonging to British Possessions and to foreign countries, provided they had been marked and certified in accordance with rules based on the same principles as those in use in this country, and were equally effective for ascertaining and determining the maximum load lines to which those ships could be safely loaded. This power of recognition is subject to the countries concerned extending to British ships corresponding recognition of their load lines. Full exercise of the power has been made, and accordingly arrangements exist whereby mutual recognition is provided covering the ships belonging to Australia, Hong Kong, India, Straits Settlements, Belgium, Denmark, France, Germany, Italy, Japan, Netherlands, Portugal and Sweden.

Furthermore, in 1913 the Board of Trade appointed a Load Line Committee for the specific purpose of preparing for an International Conference on the subject, which no doubt would have been held but for the Great War.

In connection with this question of international agreement, it is also useful to note that, although many American ships were marked with British load lines, the United States had hitherto not enacted any legislation for the compulsory marking of load lines on the sides of American ships. An Act was, however, passed by the United States Senate in 1929 requiring such marking to come into operation in September, 1930.

Thus, reasonable grounds existed for summoning an International Conference and for obtaining international agreement.

ACTION BY THE BRITISH GOVERNMENT.

As soon as the report of the Load Line Committee was in the hands of the Board of Trade, the British Government sent copies to the Governments of all the maritime countries for consideration. It was well received in this country and also abroad, being generally recognised as a comprehensive solution of the complicated technical and administrative questions involved in assigning load lines to ships under modern conditions. The value of the proposed new rules, with their simplified procedure and their provision for the equitable treatment of different types of ships, was acknowledged to such an extent that the British Government had no hesitation in issuing invitations to the Governments of the Dominions and of foreign maritime countries to appoint delegates to discuss the subject, on the basis of the Committee's report, at an International Diplomatic Conference to begin in London on May 20, 1930.

INTERNATIONAL CONFERENCE.

The various Governments accepted the invitations, and when the Conference assembled on the date mentioned, 30 countries were represented by over 150 delegates, experts and secretaries, and in addition there were appointed observers from Austria, Esthonia, Hungary, Turkey and the League of Nations. The delegates were fully representative of the shipping industry of the world, and included experienced Government administrators, naval architects (some with special knowledge of load line assignments), shipowners, master-mariners and seamen. Admiral of the Fleet Sir Henry F. Oliver, G.C.B., K.C.M.G., the Chairman of the British Delegation, was elected President of the Conference, and in his opening speech stated that its object was to promote safety of life and property at sea by concluding a satisfactory International Convention dealing with the loading limits of merchant ships and the enforcement of those limits. It was agreed that the official languages of the Conference should be French and English, and that the minutes, reports of committees and the acts of the Conference should be drawn up in these languages.

The Conference was organised into two main committees, the one dealing with the administrative side of the subject and the other with the technical side. The former considered the draft of a proposed Convention submitted by Great Britain, and the latter the new Rules contained in the British Load Line Committee's Report. In both cases, reports and memoranda submitted by various countries, setting out their practice and experience, were concurrently taken into consideration. Additional committees were appointed to deal with special load lines for tankers and for steamers carrying deck cargoes of timber, and for fixing the geographical zones in which the seasonal load lines would operate. A committee to examine the credentials of delegations and a drafting committee were also appointed.

The Board of Trade had made very complete preparations for the work of the Conference, which greatly facilitated the deliberations of the delegates. The spirit of goodwill with which the Conference opened was maintained throughout the proceedings, and made possible that co-operation which, in the end, overcame the many difficulties in the way of the agreement. The Convention was completed and signed on July 5, 1930, by the Plenipotentiaries of the following 29 countries: Germany, the Commonwealth of Australia, Belgium, Canada, Chile, Cuba, Denmark, Spain, the Irish Free State, the United States of America, Finland, France, the United Kingdom of Great Britain and Northern Ireland, Greece, India, Iceland, Italy, Japan, Latvia, Mexico, Norway, New Zealand, Paraguay, the Netherlands, Peru, Poland, Portugal, Sweden, and the Union of Socialist Soviet Republics.

FIRST INTERNATIONAL LOAD LINE CONVENTION.

Although, as mentioned above, bilateral agreements had been made under which different countries recognised the load lines marked on the ships of the others, the Convention is the first International Load Line Convention. It will require to be ratified by the Contracting Governments and will come into force on July 1, 1932, between the Governments which have deposited their instruments of ratification with the British Government by that date, provided that at least five ratifications have been so deposited. It will be useful to notice the principal provisions of the Convention.

Scope of Convention.—The Convention will apply to all ships engaged on international voyages which belong to countries the Governments of which are Contracting Governments, except:

(*a*) ships of war, ships solely engaged in fishing, pleasure yachts, and ships not carrying cargo or passengers;

(*b*) ships of less than 150 tons gross.

An "international voyage" is defined as a voyage from a country to which the Convention applies to a port outside such country, and for this purpose, every colony, overseas territory, protectorate or territory under suzerainty or mandate is regarded as a separate country.

General Provisions.—A distinction is drawn between new ships and existing ships. A "new ship" is a ship the keel of which is laid on or after July 1, 1932; all other ships are regarded as existing ships.

A ship to which the Convention applies shall not proceed to sea on an international voyage unless, being a new ship, it has been surveyed in accordance with the provisions of the Convention Rules for Determining the Maximum Load Lines of Merchant Ships, complies with the conditions laid down in the Rules, and is marked accordingly.

An existing ship shall not proceed to sea on an international voyage unless it has been surveyed and marked in the same manner as a new ship or in accordance with one of the sets of Rules particularised in an Annex to the Convention as being equivalent in effect to the British Board of Trade Rules of 1906, at present in operation in the United Kingdom. In such cases, however, a ship must comply in principle and also in detail with the Conditions of Assignment of Load Lines laid down in the Convention Rules so far as is reasonable and practicable, having regard to the efficiency of (i) the protection of openings; (ii) guard rails; (iii) freeing ports, and (iv) means of access to crew's quarters provided by existing arrangements, fittings and appliances on board.

A similar distinction is made between a new ship and an existing ship with regard to the assignment of special load lines to steamers carrying deck cargoes of timber and to tankers, which permit of deeper loading than the ordinary load line allows.

Survey.—The survey and marking of ships is to be carried out by the officers of the country to which the ships belong, provided that the Government of each country may entrust these duties either to surveyors nominated for this purpose, or to organisations recognised by it. Thus provision is made for the British practice of appointing recognised Classification Societies for the purpose. In every case however, the Government concerned fully guarantees the completeness and efficiency of the survey and marking.

Certificates.—Provision is made for the issue of International Load Line Certificates to ships complying with the Convention Rules, either by the Government of the country to which the ships belong or by any person or organisation authorised by the Government to do so. Provision is also made for the mutual recognition of the certificates by the contracting Governments.

A model certificate is provided showing the form of certificate to be used and the duration of the validity of the certificates issued, and the conditions under which they may be renewed or cancelled are laid down.

Control.—Judicious provision is made for control when a ship is in a port of a country to which it does not belong. An authorised officer, who must possess the necessary technical qualifications, may take steps to see that there is on board a valid International Load Line Certificate. If there is such a certificate on board, he can see that the position of the load line marked on the sides of the ship corresponds with the position stated in the certificate, that there are no material alterations in the conditions under which the certificate was issued, and that the ship is not manifestly unfit to proceed to sea without danger to human life. If the result of this control is likely to lead to the detention of the ship or to legal proceedings, the consul of the country to which the ship belongs must be informed of the circumstances of the case.

Modifications.—Modifications of the Convention which may be deemed useful or necessary improvements may at any time be proposed by any Contracting Government to the Government of the United Kingdom, who shall communicate them to the other Contracting Governments, and if they are accepted the Convention shall be modified accordingly.

In addition provision is made for another Conference to be convened by the Government of the United Kingdom after the Convention has been in force for five years, provided one-third of the Contracting Governments express a desire to that effect. The United States, however, has the right to ask for a Conference to be held within the five-year period for the purpose of discussing matters relating to tanker freeboard.

Recommendations.—Besides the definite provisions of the Convention, the four following recommendations are made. They emphasise the importance which the Conference attached to the principle of uniformity being maintained with respect to the Convention Rules and their application.

(1). Ships under 150 tons gross engaged on international voyages do not come under the operation of the Convention, but the Conference recommends that such regulations as may be made by any of the Contracting Governments relating to these ships should, so far as practicable and reasonable, be framed in accordance with the principles and rules laid down in the Convention; and should whenever possible be made after consultation and agreement with the Governments of the other countries concerned in such international voyages.

(2). Ships which comply with the highest standard of strength laid down in the rules of a Classification Society recognised by an Administration are regarded as having sufficient strength for the minimum freeboards allowed under the Convention Rules. The Conference therefore recommends that the recognised Societies should be requested to confer from time to time with a view to securing as much uniformity as possible in the application of the standards of strength on which freeboard is based.

(3). Following the proposal made in the report of the British Load Line Committee, the Conference recommends that each Administration should make arrangements for periodical inspections to be held at intervals of approximately twelve months so far as concerns (i) the maintenance of the fittings and appliances for the protection of openings ; (ii) guard rails ; (iii) freeing ports, and (iv) means of access to crew's quarters.

If this recommendation is generally adopted, it will do much to preserve uniformity in administration, besides safeguarding the continued efficiency of the provisions for closing openings in weather decks and for the protection of the crew.

(4). During the discussions on the question of the extra depth to which tankers could be loaded with safety, it was obvious that the lack of experience of all the delegates, except those representing the United States of America, of any such deeper loading made them somewhat diffident in arriving at the decision on the subject embodied in the Convention Rules. In view of this position, the Conference recommends that the Governments of countries to which tankers belong shall keep records of all structural and deck damage caused by stress of weather, so that information with regard to these matters may be available.

THE CONVENTION RULES.

The Governments of the countries represented at the Conference having accepted the Report of the British Load Line Committee as a basis for discussion at the Conference, it was practically certain that there would be no wide divergence of opinion amongst the technical experts as to the suitability for international adoption of the Rules for Determining the Maximum Load Lines of Merchant Ships formulated by that Committee. Such proved to be the case ; and the measure of the unanimity of opinion on this point is to be found in the fact that it took a period of only seven weeks to arrive at full agreement on the Convention Rules. With such a subject, involving highly technical and economic questions, this was an achievement which reflected considerable credit on the work of the British Committee. As might be expected, there were differences of opinion on certain parts of the rules. For instance, it was felt by some delegates that many of the details inserted in the proposed British Rules were too elaborate to admit of that measure of elasticity in administration required in the application of international rules ; on the other hand, it was necessary to lay down precise standards in the Convention Rules if uniformity of practice was to be ensured, and it was agreed that such uniformity was essential. Thus, after careful consideration, a few of the details were omitted, but the bulk of them were retained. In other respects modifications of the proposed British Rules were made, but in general it can be said that in principle, detail and structure, the rules as formulated by the British Committee were adopted for the purposes of the Convention. Those rules aimed at simplicity and directness of application and at equitable treatment for different types of ships, and in these respects the Convention Rules have the same effect.

There is no room for a detailed examination of the Convention Rules, but mention may be made of some of their principal provisions in relation to the proposed Rules of the British Load Line Committee, which were the subject of the discussions.

Stability.—In all sets of Load Line Rules which have been formulated there has always been a reservation respecting the important question of stability. The Convention Rules begin with the statement that "The Rules necessarily assume that the nature and stowage of the cargo, ballast, etc. are such as to secure sufficient stability for the ship."

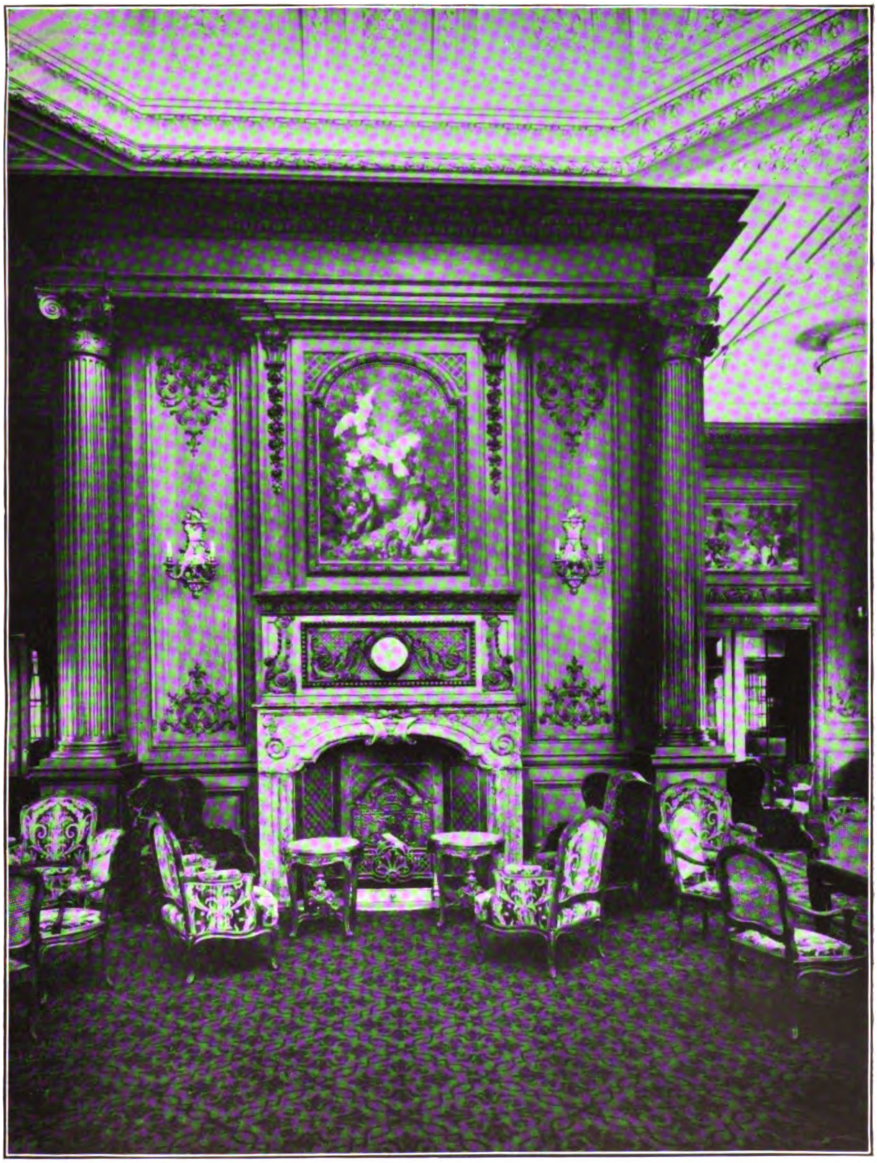
Conditions of Assignment of Load Lines.—The British Load Line Committee considered that the standard Conditions of Assignment of Load Lines which they incorporated in their proposed Rules were of vital importance, especially those dealing with the means of closing openings in weather decks. The Conference took the same view, and added the provision that even in ships to which freeboards greater than the minimum are assigned the protection is to be relatively as effective.

The Conditions deal in a specific manner with the construction of cargo and other hatchways and the arrangements to close them, such as covers, hatchway beams and fore-and-afters, cleats, battens and wedges, tarpaulins, etc.; also in a similar manner with machinery space openings, companionways, ventilators, openings in the sides of ships, such as coaling ports, sanitary discharge pipes, etc., and the arrangements for closing them. In fact fittings and appliances are prescribed in order to guard against water entering any compartment of the hull. Protection for the crew is also prescribed by requiring efficient guard rails or bulwarks to be fitted on all exposed portions of freeboard and superstructure decks, and gangways, lifelines or other satisfactory means to be provided for the crew in getting to and from their quarters. In addition, a scale of freeing port area is laid down for freeing the decks of water and for draining them.

It is worth noting that these Conditions of Assignment are almost word for word the same as those prescribed in the Rules proposed by the British Load Line Committee, and that they must be fully complied with before the minimum freeboards are assigned.

Load Lines for Steamers.—The method of arriving at the load lines for steamers is the same as the practice which has been in operation since load-line rules were first formulated, and follows the procedure of the proposed Rules embodied in the British Load Line Committee's Report, although some modifications have been made in the details, as, for instance, changes in the deductions from freeboard for superstructures and also for excess sheer.

The primary consideration of the structural strength of ships



LOUNGE OF HOLLAND-AMERICA S.S. STATENDAM.

in relation to the freeboards assigned was the subject of detailed discussion by the Main Technical Committee of the Conference. Since 1885 the British standard of strength used for load line purposes has been that laid down in the rules of Lloyd's Register of Shipping of 1885. To a ship not complying with the full scantlings of this standard corresponding to her dimensions an increased freeboard is assigned. The British Load Line Committee of 1913–15 proposed a departure from this standard, formulating a standard in relation to freeboard for international purposes based upon certain moduli for longitudinal strength and transverse strength for cargo-carrying steel ships of ordinary type. The British Load Line Committee of 1927–29 adopted with slight modifications these strength moduli as a guide in dealing with unclassed ships, but considered that classed ships built to the highest standard of the classification rules of an Assigning Authority approved by the Board of Trade should be regarded as having sufficient strength for the minimum freeboards allowed under their proposed Rules. The International Conference finally took the same view of the subject and the rules relating to strength in the Convention Rules are as follows :

> "The Assigning Authority is to be satisfied with the structural strength of ships to which freeboards are assigned.
>
> "Ships which comply with the highest standard of the rules of a Classification Society recognised by the Administration shall be regarded as having sufficient strength for the minimum freeboards allowed under the Rules.
>
> "Ships which do not comply with the highest standard of the rules of a Classification Society recognised by the Administration shall be assigned such increased freeboards as shall be determined by the Assigning Authority, and for guidance the following strength moduli are formulated." (The strength moduli are then set out, and are the same with very slight modifications as those in the proposed Rules of the British Load Line Committee, 1927–29.)

The basic minimum summer freeboards for steamers complying with the standards laid down in the proposed British Rules approximate closely to the minimum summer freeboards obtained by the application of the British Rules of 1906 now in operation. The same remark may be applied to the result obtained by the application of the Convention Rules. When a comparison is made between the minimum summer freeboards given in the "Freeboard Table for Steamers" in the Convention Rules and the minimum summer freeboards given in the similar Table in the proposed British Rules, it is found that the freeboards of small steamers up to and including 230 feet in length are slightly greater under the Convention Rules, but that otherwise the minimum summer freeboards are the same. Winter freeboards have, however, been somewhat increased, as they were under the proposed British Rules. Further, an increase in freeboard is prescribed for flush deck steamers by an addition to the minimum freeboards given in the "Freeboard Table for Steamers," at the rate of 1½ inches for every 100 feet of length. Thus, the Convention Rules encourage the building of the safer type of ship with superstructures covering the whole or a part of the weather deck.

Load Lines for Sailing Ships.—The method of arriving at the load lines for sailing ships is the same as hitherto employed, and the details with slight modifications are the same as those given in the proposed Rules of the British Load Line Committee.

Load Lines for Steamers Carrying Timber Deck Cargoes.—The Rules provide for the assignment and marking of special timber load lines permitting deeper loading than the ordinary load lines allow, but these special lines are to be used only when the steamer is carrying a timber deck cargo in compliance with conditions and regulations for deeper loading supplementary to those contained in the general Conditions of Assignment of Load Lines already mentioned. These supplementary conditions provide for the construction of the ship. The structure must be of sufficient strength for the deeper draught and for the weight of the deck cargo; the ship must have a forecastle, and in addition a poop or raised quarter deck with a strong steel hood or deck house aft; machinery casings on the freeboard deck must be protected by a superstructure; permanent bulwarks specially stiffened, or efficient rails of specially strong construction, must be fitted, and double bottom tanks where fitted within the midship half-length of the ship must have adequate longitudinal subdivision. There are also specific provisions to be fulfilled as to the stowing and securing of the deck cargo, the protection of the crew, etc. The conditions are practically the same as those proposed by the British Load Line Committee, although modified in respect of some of the details.

The method of arriving at the special timber load line is to regard the timber deck cargo, when stowed and secured in accordance with the precise conditions laid down, as being of the nature of a superstructure entitling the ship to special consideration, and that consideration is made by modifications of the deductions for superstructures allowed when arriving at the ordinary load line. The effect of the Convention Rules is to allow of deeper loading somewhat in excess of that proposed by the British Load Line Committee.

Load Lines for Tankers.—The British Load Line Committee accepted the principle of giving preferential treatment to tankers by permitting them to load deeper than the ordinary load line allows, mainly because of the efficient protection provided for openings in weather decks by means of steel watertight covers, taken in conjunction with other characteristics of tankers, such as special construction and the provision of a satisfactory height of working platform by means of a strong fore-and-aft gangway. The Committee did not prescribe the exact extra draught to be permitted, but they did specify special supplementary Conditions of Assignment for deeper loading. The Convention Rules provide the amount of deeper loading in a "Freeboard Table for Tankers," and, with modifications, the Supplementary Conditions of Assignment proposed by the British Committee have been adopted. The ship is to be strong enough for the increased draught corresponding to the freeboard assigned, and it is to have a forecastle of which the length is not less than 7 per cent. of the length of the ship. Machinery casings are to be protected by a superstructure, and their openings fitted with steel doors. An efficiently constructed permanent gangway of sufficient strength for its exposed position is to be fitted fore-and-aft at the level of the superstructure deck for the use of the crew. Other conditions provide for the closing of hatchways, the protection of ventilators, and the freeing of the decks from water.

The method of arriving at the load lines of tankers is the same as that for the load lines of ordinary cargo ships, except that the Supplementary Conditions of Assignment must be complied with, and the actual freeboard is, of course, computed from the Table for Tankers. Some idea of the deeper loading permitted may be gained by comparing the "Freeboard Table for Steamers" with that for Tankers. The minimum summer freeboard for an ordinary steamer 400 feet in length is 71·5 inches ; for a tanker of the same length it is 62·5 inches, a difference of 9 inches.

It should be noted that for voyages across the North Atlantic during the winter months the minimum freeboard for tankers is the winter freeboard plus an addition of 1 inch per 100 feet in length, and this applies to all tankers. The ordinary minimum winter North Atlantic freeboard applies only to ships not exceeding 330 feet in length and is an addition of 2 inches to the winter freeboard.

Seasonal Load Lines.—The International Conference found considerable difficulty in fixing the boundaries of the zones and seasonal areas in which the various seasonal load lines should operate. In the final settlement of these boundaries, alterations were made in the proposals contained in the British Load Line Committees' Report, which were based on the recommendations of the British Load Line (Zones) Committee, 1923–24. The main feature of the new zones is the alteration of the Indian Summer Zone, which is extended beyond the Indian Seas right round the world in tropical regions. The old Indian Summer Load Line is consequently renamed the Tropical Load Line. The North Atlantic winter area is changed, inasmuch as while it extends north, as hitherto, from Lat. 36° N., the periods of the seasons, winter and summer, are altered. The winter season is from November 1 to March 31 inclusive, and the summer season from April 1 to October 31 inclusive, except for an area in the middle of the Atlantic Ocean, bounded on the south by Lat. 45° N., on the west by Long. 50° W., and on the east by Long. 15° W. In this area, the winter season is longer, from October 16 to April 15, and the summer season is from April 16 to October 15. There are also alterations in the boundaries of the summer and winter zones in different parts of the world.

It is hoped that this review of the International Load Line Convention will afford some knowledge of its comprehensive character. It lays down higher and more precise standards for the assignment of load lines than have ever existed before, and at the same time it provides machinery for international administration. When ratified and put into operation by the Contracting Governments it will do much to ensure uniformity in the loading limits of ships in all the ports of the world, and to increase the safety of life and property at sea. Already the Government of the United States has embodied in its Load Line Regulations, which came into force on September 2, 1930, the administrative principles and the detailed rules for assigning load lines to ships contained in the Convention. The Convention opens a new chapter in the long history of sea transport, and should facilitate the smooth working of those sea communications on which the general welfare of mankind so largely depends.

CHARLES J. O. SANDERS.

CHAPTER XVII.

THE P. AND O.

IN 1798 the British East India Company established the first regular monthly mail service, *via* the Persian Gulf, between Bombay and England, the mails being dispatched on the first of every month.

In 1829 rules were made for the conveyance of mails in the East India Company's steamers *via* the Red Sea to Suez, and for their carriage by land across the Isthmus to Alexandria and thence by sea to Europe.

In 1834 a Select Committee of the House of Commons inquired into the means of providing communication by steamer with India, and resolved in their report dated July 14, 1834, that the establishment of regular and expeditious communication by means of steam vessels was an object of great importance both to Great Britain and to India. They recorded that the Indian Government had found it practicable in the North-East Monsoon (but not during the South-West Monsoon period—June, July, August and September) to run steamers from India to Suez during five successive seasons. The Committee left it to be decided by H.M. Government whether Bombay or Calcutta should be the Mail port.

Previously to this, however, in 1830, General F. R. Chesney had begun to interest himself in an improved line of communication with India either by the so-called "overland route" across Egypt or by that through Mesopotamia and the Persian Gulf. He was in Egypt in 1830, and reported on the mail route through the Red Sea, and in the following year he proceeded overland from Beirout to Amah on the Euphrates, to discover whether that river was navigable from there to the sea. He rather favoured the Euphrates route, on account of its being 170 miles shorter than the route by the Nile and Red Sea. Ultimately, General Chesney transported two steamers in sections from the Mediterranean to the Euphrates, where he put them together, and ran them. Ferdinand de Lesseps, the builder of the Suez Canal, acknowledged his obligation to General Chesney for the surveys and the reports he made at that early period as to the Suez route, one important fact established by him being that there was no great difference, as had been suggested, in the levels of the Red and Mediterranean Seas.

In the latter part of 1829, Lieutenant Thomas Waghorn left London to investigate the possibilities of steam communication with India *via* the Red Sea and the Mediterranean, and in 1833 he started his enterprise of the carriage of mails across Egypt, thence conveying them by the Red Sea to Bombay. In a circular letter dated January 8, 1835, he said :

> I write to inform you and other Merchants connected with India that I leave London on Tuesday the 5th and Falmouth on Friday the 8th February, by the Steam Packet for Malta. On my arrival there, I leave again forthwith for Alexandria, from there by land to Suez, sail down the Red Sea (wind is fair) and across the sea for Bombay, where I expect to arrive in 70 days from England. On this occasion, I shall carry as many single letters as I can get at Five Shillings each.
>
> Any letters that your Firm or your friends may wish to send by this quick opportunity for India I shall be glad to take. I shall be in England again in November next, and in all probability go (should a steam communication not be established between England and India) ANNUALLY in FEBRUARY by this route so that ONCE A YEAR we may be certain of a quick communication with India.

By 1838 Waghorn had established regular monthly communication between Bombay and England. The mails were carried as far as Suez by steamers of the Indian Navy, and conveyed thence by caravan to Cairo and Alexandria, from which port English steamers carried on the service to Marseilles. This method was a mixture of official and private enterprise which was not altogether satisfactory, and it was not until 1842, when the P. and O. Company embarked on an Indian mail service, that the responsibility for the conveyance of the Eastern mail was placed in the hands of a single organisation.

The Peninsular Company.

The origins of the Peninsular and Oriental Steam Navigation Company may be traced to the early years of last century, when the firm of Wilcox and Anderson carried on a trade with the Iberian Peninsula by means of sailing ships running between London, Oporto, Lisbon and Gibraltar. In 1832, Dom Pedro, the father of the rightful Queen of Portugal, emerged from his retirement in Brazil, and began a campaign for the ascent by his daughter of her throne. In these operations Arthur Anderson, the firm's junior partner, took an active part, conveying to England the disguised Portuguese officials who were to raise in London the greater part of the funds necessary for the support of Dom Pedro's plans ; later the firm of Wilcox and Anderson rendered further assistance by fitting out one of their ships as an ammunition carrier. Dom Pedro's movement was successful, and in 1833 the Queen became the ruler of a reformed state. These efforts of Wilcox and Anderson increased their prestige in Portugal and inspired a feeling of gratitude in the Royal Family of that country.

By the following year (1834) Messrs. Wilcox and Anderson were running steamships, chiefly chartered vessels, on the London–Gibraltar route. Of this time were the William Fawcett, built in 1829, and the Royal Tar. The Iberia, completed in 1836, was the first steamer specially built for the line. In 1837 the Peninsular Steam Navigation Company was constituted and Anderson's efforts on behalf of the Portuguese Queen bore fruit, the Portuguese influence being invoked to secure the grant by the British Government of a contract for the carriage of mails between Falmouth and Gibraltar. The ports of call on this route were Vigo, Oporto, Lisbon and Cadiz, and the sailings were soon increased from three each month to one each week.

"P. and O."

By charter dated December 31, 1840, the Company assumed the title, by which it is known to-day, of "Peninsular and Oriental Steam Navigation Company." In the interval its lines of communication had been extended to Malta and Alexandria, and the way paved for the important trade to India and Australia *via* the Isthmus of Suez, of which the addition to its name of the word "Oriental" was the portent. The dispatch of the Hindostan upon a mail contract service to India in 1842 was followed by the allocation to the Eastern services of other vessels in relatively rapid succession. The voyages of these ships to station were sometimes conducted in a way which, though seamanlike, would to-day be thought highly unorthodox. It is curious to read the instructions issued to a commander to navigate a new steamer round the Cape under sail with her paddles unshipped, thus, as a matter of prudent ownership, lessening the cost of the voyage. It must be added that the new ship was escorted by another of the Company's vessels bound to the same Eastern station and proceeding under easy steam.

By 1844 the Company had accomplished sufficient pioneer work to enable it to extend its mail services to Ceylon, Madras and Calcutta, with a branch service from Ceylon to the Straits and China. The way *via* Suez was then, and for many years after, distinguished as "The Overland Route." Coal for the Eastern stations went out *via* the Cape in sailing brigs; that for Suez was sent by sailing vessel to Alexandria, thence by the Mahmoudieh Canal to Cairo, and thence by camel train across the desert to Suez. Caravans numbering more than 3,000 camels were needed to transport the cargo of a single steamer between Suez and Cairo, but the merchandise carried—indigo, tea, silk and precious metals—was of a kind and value to make this expensive form of transport practicable. The trade thus handled by the P. and O. Company sometimes attained an annual value of forty millions sterling, but even with the high freights then ruling, the services would have been commercially impossible of maintenance and improvement without the subsidies earned under the mail contracts; the successive contracts to Gibraltar, to Alexandria and to Calcutta, and the extension from Ceylon to Shanghai involved annual subventions totalling £225,000. But on the most expensive route—Suez to Calcutta—the working costs per mile were fully 50 per cent. below those of the slower and less commodious fleet which the Honourable East India Company continued to run for the carriage of the mails between Bombay and Suez. In 1854 the Bombay mail service passed from the hands of the East India Company into those of the P. and O. Company, which then, by a series of contracts which had in every case passed the ordeal of public tender, became the sole trustee of the British mail services to the East. Steam communication with Australia, by means of a branch line from Singapore, had been inaugurated by the Company in 1852.

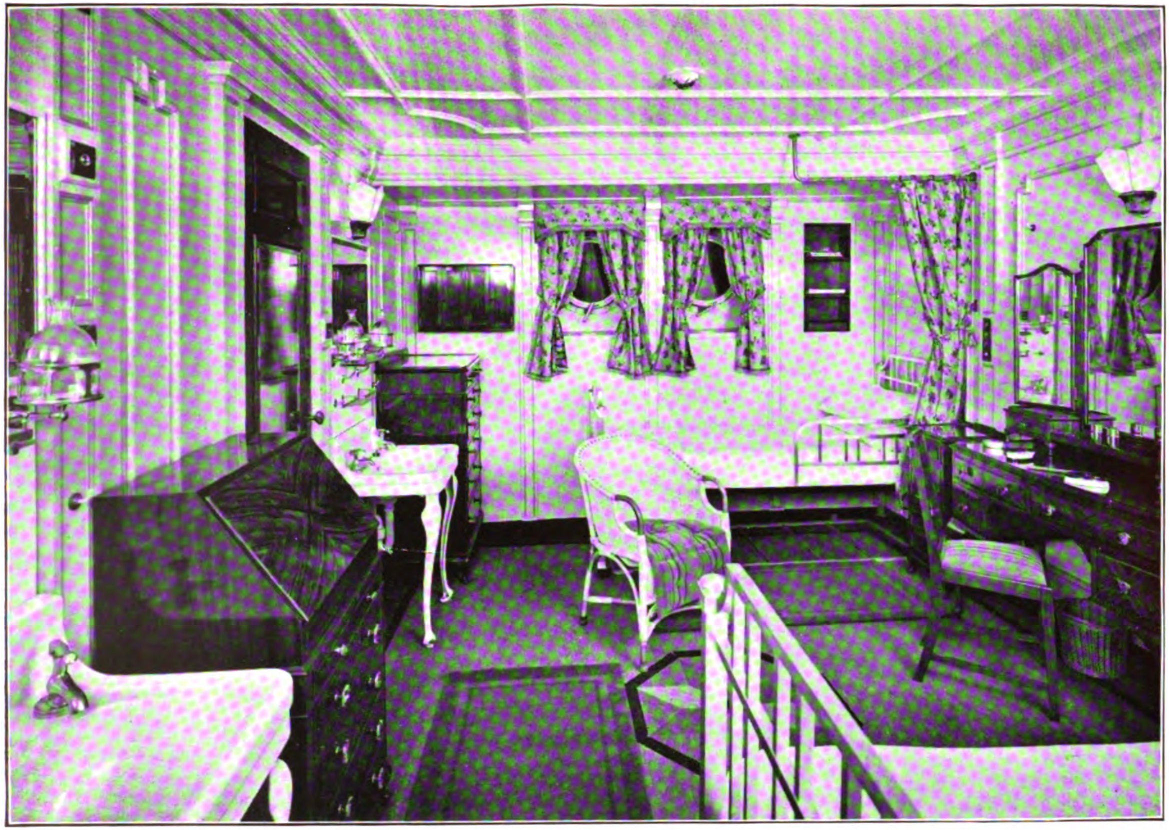
THE P. AND O. HOUSE FLAG.

The origin of the P. and O. Company's house-flag is sometimes a subject of inquiry. It was from early connections with the Iberian Peninsula that the house-flag was evolved. The luff or inner side of the Portuguese royal flag was blue, the outer half being white; superimposed in the centre of the flag were the Portuguese royal arms. From this flag were derived the blue and white triangular upper quarterings of the house-flag, the red and yellow of the flag of Spain furnishing, by adoption, the colours which fill the lower triangle. The earliest extant representations of the flag show some divergence from the form in which it is known to-day. In contemporary pictures of the Royal Tar (308 tons, built 1832), Jupiter (610 tons, built 1835) and Braganza (688 tons, built 1836) the flag is shown as a pennant, with the yellow quartering at the top, flown by the two earlier vessels at the fore and by the last-named at the main.

ARMAMENT OF EARLY P. AND O.'S.

The picture of the Braganza, above alluded to, shows gun ports on the lower deck, and similar ports opening outwards from the main saloon beneath the poop, and it may be recalled that the earlier contracts for the carriage of mails were made not with the Post Office, but with the Admiralty. Under the contract of August 22, 1837, made between the Admiralty and Richard Bourne on behalf of the "Peninsular and Oriental Steam Packet Company," it was stipulated that an officer of His Majesty's Navy should be carried on board the mail packets as agent of the Government. In the contract of August 26, 1840, it was a condition that the ships by which the service was to be carried on should be constructed "to carry 4 guns of the largest calibre now used in the Navy." It was a part of the mail contract of January 1, 1853, that ships over 1,110 tons, driven by paddle wheels, were to be fitted for carrying and firing one 10-in. piece at the bow, and, as a stern pivot, one 32-pounder, with four 32-pounders as a broadside; while screw-driven ships of 1,100 tons and upwards were to, and did, carry eight 32-pounders. Later contracts, made with the Post Office, contained no stipulations as to guns, the practice of carrying which in the Eastern mail steamers thus fell into disuse. But the P. and O. steamers continued to carry heavy stands of small arms. In the Red Sea and China Seas ships were long liable to be attacked by pirates, especially in the event of temporary stoppage through accident to their machinery.

With the lengthening of the P. and O. routes and the extension to India, China and Australia of the Company's obligations, the connection with Iberian ports, save Gibraltar, came to an end. But in the house-flag a continual reminder survives of the days when the little steamers of the line first began to ply across the Bay, carrying mails, passengers or cargo to Portugal and Spain.



FIRST-CLASS TWO-BERTH CABIN IN NEW ZEALAND SHIPPING COMPANY'S M.S. RANGITIKI.

THE SUEZ CANAL AND THE COMPOUND ENGINE.

A great and adverse change in the Company's fortunes came from the opening to the whole world of the shorter Eastern trade route, as a consequence of De Lesseps' piercing of the Isthmus of Suez. The opening of the Suez Canal in 1870 synchronised with the practical adoption of the compound engine as the motive power of the mercantile marine. Thus the elaborate organisation built up by the P. and O. Company in connection with its " overland " trade became, from the one cause, almost valueless ; and its fleet, in which was sunk an immense capital, was, from the other cause, rendered practically obsolete. With indomitable courage the Board of Directors set to work to revise the Company's financial resources and to create a new fleet, and this in the face of reduced, and at one time vanished, profits. Their difficulties were not lessened by the obstinate refusal of the Post Office to allow the mails to be transported through the Canal. While its rivals were reaping the full advantage, in time and lessened cost, of the new waterway, the Company was forced to continue the transit of the mails by land between Alexandria and Suez ; and this objection was not finally overcome until the year 1888, when the Canal had been eighteen years in existence. By that time the P. and O. fleet had again begun a process of transformation by the construction of the four vessels Arcadia, Britannia, Oceana and Victoria, known as " the Jubilee ships " from their having been projected in the fiftieth year of the late Queen Victoria's reign, which was also the fiftieth year since the formation of the corporation under its original title of the Peninsular Company.

GROWTH OF THE FLEET.

The quarter of a century which followed was a period of continuous advancement in the character and dimensions of the P. and O. passenger and mail steamers. The " Victoria " class, of about 6,500 gross tons, was succeeded by the Australia and Himalaya, of 7,000 tons, and the Caledonia, of 7,500 tons, and these again by the five ships of the " Persia " class, of 8,000 tons. Then came the Moldavia and her successors of the " M " class, including the Kaisar-i-Hind, ten vessels averaging about 10,500 tons. The next mail steamers, Naldera and Narkunda, marked a leap in size and design. Projected in 1913 they were, owing to the exigencies of the War, not brought into normal service until the spring of 1920. These vessels are of 16,000 tons gross measurement.

POST-WAR RECONSTRUCTION.

The P. and O. Company's post-War building programme has included first the construction of five vessels, each of 13,000 tons, for the P. and O. Branch Line, formerly routed *via* the Cape but now running *via* Suez and Colombo, vessels which were a marked advance on anything previously engaged in the one-class service to Australia.

To repair, under Lord Inchcape's régime, the P. and O. Company's immense war losses and to bring the services to their former frequency, an extensive programme of new mail steamer construction was undertaken. The Mooltan and Maloja, each of 21,000 tons, placed in service in 1923, are the largest ships engaged in the Australian service and the largest trading regularly through the Suez Canal. A year later, five ships for the India Mail Service were launched. These were the Ranchi, Ranpura, Rawalpindi and Rajputana, each of 16,600 tons, and the Razmak, of 10,700 tons, all placed in commission in 1925. At the same time three new Australia mail steamers, the Cathay, Comorin and Chitral, were constructed, making with the Naldera and Narkunda, and the Mongolia and Moldavia built in 1922, an entirely new fleet engaged in the service to Australia. Oil fuel is adopted in these vessels, and their refrigerated holds enable large quantities of perishable cargo to be carried. Other additions to the P. and O. fleet included the Lahore, Alipore, Nagpore, Jeypore, Kidderpore and Mirzapore, steamers with large hatches, especially constructed as cargo carriers.

In 1929 there was placed in service the Viceroy of India of 19,700 tons, the interior arrangements of which embody a new principle, in that in the first saloon she has only single-berth cabins, which can be converted into suites, or family groups of cabins, by communicating doors. The vessel is further remarkable as the first British liner to be equipped with turbo-electric machinery, and her performances have been watched all over the world with immense interest by shipowners and their technical advisers.

In the same year calls at Malta with mails and passengers were instituted, and in 1930 Brisbane was made the terminal port in the Company's Australian service. Two fine turbo-electric vessels, Strathnaver and Strathaird, each of 21,000 tons, are now under construction at Barrow for the P. and O. Australian Mail Service, and two others have been laid down for the Company's mail line between London, the Straits and the Far East. These latter will be twin-screw turbine-driven vessels of 14,700 tons gross.

LORD INCHCAPE'S CHAIRMANSHIP.

By May, 1914, negotiations were afoot for the fusion of the P. and O. and British India Companies, and this fusion became effective at the close of the year, when Sir Thomas Sutherland, after 34 years' occupancy of the presidential chair, was succeeded by Lord Inchcape as chairman of the joint and identical boards of the two Companies. Some account of the War services of the two Companies and of those corporations which, during the War period, became their associates has been given in a volume published in 1920,* but it will be appropriate to summarise these alliances here. In June, 1916, an amalgamation was effected with the New Zealand Shipping Company and its associate, the Federal Steam Navigation Company. A year later there was acquired for the P. and O. Company a representative interest in the Union Steam Ship Company of New Zealand, and this was shortly afterwards followed by the purchase of the Hain and Mercantile Steamship Companies respectively, and the enterprise of Messrs. James Nourse, Limited, a line of steamers running between Calcutta and the West Indies. In the following year, 1918, the group was further strengthened by closer association with the Orient Line, which had for many years alternated with the P. and O. in maintenance of the weekly mail transit to and from Australia. In 1919 the Australasian United Steam Navigation Company, a subsidiary of the British India Company, acquired control of the steamers and trade of the Eastern and Australian Steam Navigation Company, which operates a regular service of steamships between Australia, China and Japan *via* Manila. Finally, there was added to the group the General Steam Navigation Company, from which had been chartered, as far back as 1834, one of the steamers with which the old Peninsular service commenced its regular operations.

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* "Merchant Adventurers, 1914–1918," by F. A Hook. 10*s.* 6*d.* Illustrated. (A. and C. Black, Ltd.)

These successive alliances have produced a single traffic system which touches every considerable port of the British Empire, and provides three distinct world-encircling main routes embracing India, China, Australia, New Zealand, and the Americas, with access over most of the by-ways of travel and commerce throughout the globe.

The shipping owned by or associated with the P. and O. and British India Companies totals to-day not far short of 2,500,000 gross register tons ; and the opinion may be expressed that to have brought these former friendly rivalries into a state of complete co-operation, with interchangeability of passenger tickets and steamship services, has provided the travelling public with a series of advantages, the value and convenience of which will be more and more perceived as time advances.

It may be anticipated that the P. and O. Company will gain in reputation and popularity by the decision to substitute for the more usual second-class accommodation in certain of its Australian steamers (including the two new 21,000-ton ships) " tourist saloon " arrangements at a scale of fares much below the second-class rates, thereby meeting and encouraging the growing demand in both Great Britain and Australia for superior yet inexpensive facilities for passengers bound to or from the Southern Dominions.

F. A. H.

[For some of the information in this article the writer is indebted to a privately printed pamphlet, "The Eastern P. and O. and Mail Service," by W. Taylor.]

CHAPTER XVIII.

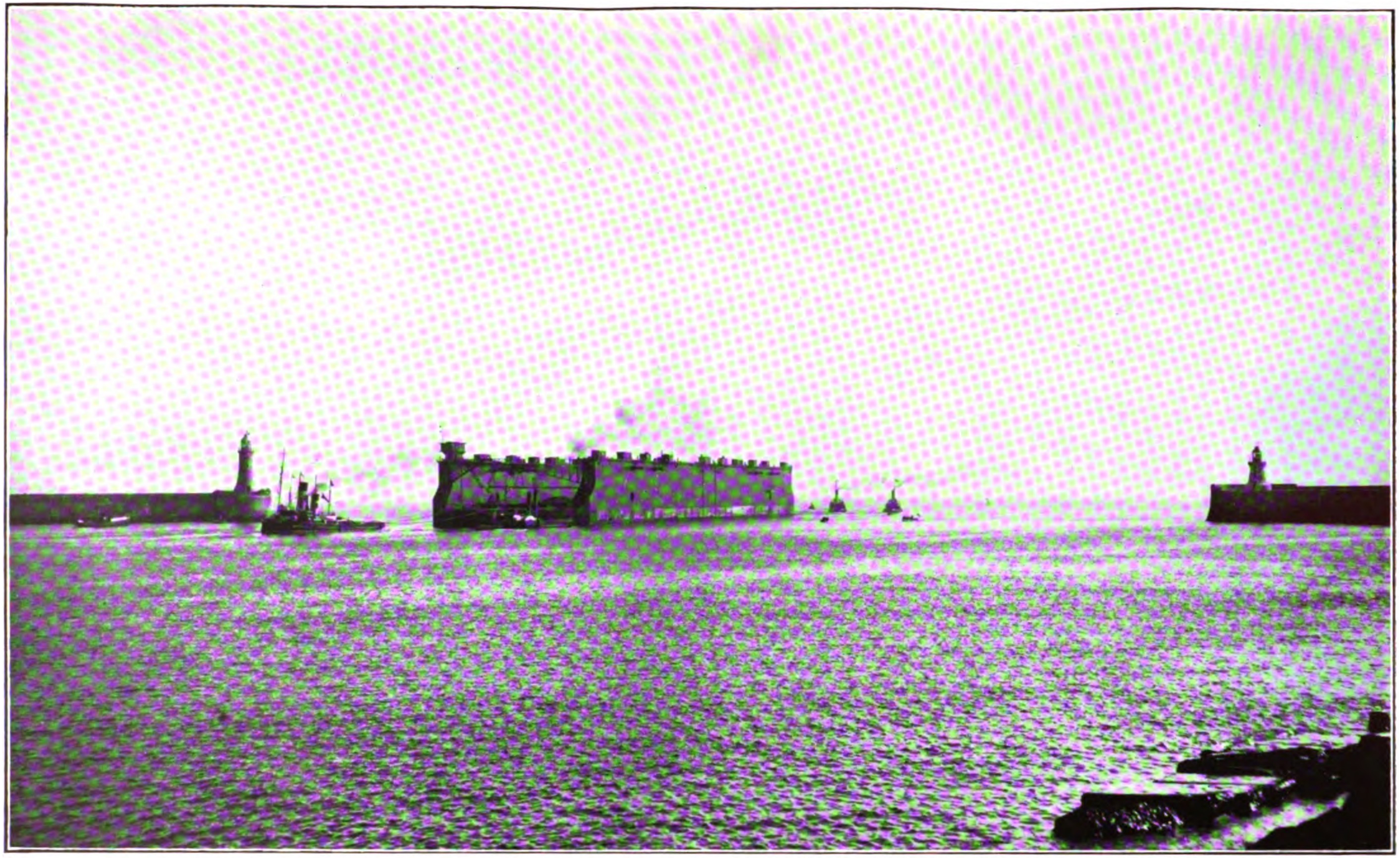
THE PORT OF TYNE.

OF the industrial rivers of Britain, there is hardly one that has greater claims to distinction than the Tyne. It is at once ancient and modern, a small river but a great coal port and shipbuilding and engineering centre, and in a very special sense it is a man-made waterway, the history of which since 1850 has been one of undaunted and sustained local effort.

The Tyne is what it is to-day not because Nature was kind to it, but because Tynesiders themselves deliberately set to work on a great scheme of development which, in effect, has been realised and now stands as an enduring monument to their foresight, energy, and tenacity. A typical story is told, of a Tyneside seaman's apt retort to an American who was boasting of the magnificence of the Mississippi compared with the petty creeks of England. "Ah weel," said he, "God Almighty made your rivers, but on the Tyne we made oor awn." It is literally true. Nature did much for the north-east corner of England in laying there a great coalfield, but she did little for the Tyne, which, before it became the world-famous outlet for Northumberland and Durham coal in the nineteenth century, was a tortuous, shallow stream, full of shoals and sand-banks, with a bar at its entrance which left only some six feet of water at low tide. The port of Tyne could not have become what it is to-day but for the bold scheme of the Tyne Improvement Commission, appropriately conceived, energetically carried out, and still after eighty years of uninterrupted effort, in process of being perfected to keep pace with the spacious needs of the twentieth century.

RIVER IMPROVEMENT SCHEME.

This scheme, it may be said in brief, has involved the straightening and deepening of some sixteen miles of the river so as to carry the tidal flow from the sea up to Hedwin streams and provide sufficient water to take loaded steamers of 10,000 tons up to Newcastle Quay and to float warships at Elswick. Three great "Points" have been bodily cut away at Whitehill, Bill Point and Lemington in order to straighten the channel, and two magnificent piers have been built into the sea to form the harbour. The Northumberland and Albert Edward docks on the north bank and Tyne dock on the south bank, as well as capacious staiths at Whitehill Point, near the sea, and at East and West Dunston, above Newcastle, have been constructed for the shipment of coal, and at Newcastle a fine deep-



[*Reproduced by courtesy of the Tyne Improvement Commission.*

ENTRANCE TO THE TYNE, WITH FLOATING DOCK PASSING BETWEEN THE PIERS.

water quay has been provided by the Corporation. The old Tyne Bridge has been demolished and replaced by the Swing Bridge, and a new steel road bridge has been added, vying in height with the High Level and King Edward bridges of the London and North Eastern Railway. The incessant work of a fleet of dredgers and hoppers has scooped no less than 156,000,000 tons of material from the bottom of the river and carried it out to sea, and on the bar there are now well over 30 ft. of water at low spring tides, and at Newcastle Quay 20 to 25 ft. Over the bar, where once small collier brigs bumped and grounded, the Mauretania, drawing 32 ft. 6 in., the Aquitania, 31 ft., and the Berengaria, 33 ft. 6 in. have all passed safely into port for reconditioning. On this work, the Tyne Commission alone have expended to date a sum of £27,907,000, while the North Eastern Railway also has spent many millions.

The Docks.

The docks are capacious and up-to-date. Tyne Dock, which is the oldest coal-shipping dock in the country and has the reputation of exporting more coal than any other dock in the world, is 50 acres in extent, has four staiths for the shipment of coal, providing accommodation for 16 vessels, and is equipped with 36 electric hydraulic and steam cranes for discharging cargoes, 14 warehouses and transit sheds for the accommodation of general goods, wood, and grain, and large timber pounds. Tyne Dock is capable of shipping up to 7½ million tons of coal and coke a year, and in all has during its career sent away over 313 million tons. Northumberland Dock, also 50 acres in extent, possesses eight coal-shipping staiths and a quay 450 ft. long, equipped with four steam cranes and three large sheds for general merchandise. Its coal-shipping capacity is up to 2½ million tons a year. Albert Edward Dock is 22¼ acres in extent and can accommodate vessels drawing 25 ft. of water. It is equipped with 20 hydraulic and steam cranes, a coal-shipping staith with two berths, a large warehouse, 3,000 ft. of quay space, and a railway passenger platform in direct communication with the London and North Eastern Railway system. The dock is capable of shipping about a million tons of coal a year.

River Coal Staiths.

The river staiths are of great capacity. At Whitehill Point there are five, with hydraulic lifts, coal band conveyors and anti-breakage appliances, besides two small staiths for the use of fishing craft, tug boats, etc., the whole being capable of shipping 2,600,000 tons of coal annually. There are 25 to 30 ft. of water at low spring tides at these staiths, which are much used for bunkering large steamers. Dunston staiths, which lie above Newcastle bridges, consist of a high level jetty extending into the river with six loading berths equipped with electric coal conveyors and gravity spouts.

There are 25 ft. of water at the staiths, a depth which permits loading to be carried on at any state of the tide. Their annual coal-shipping capacity is about 5,500,000 tons. West Dunston staiths, a later addition, consist of a high level jetty with three loading berths fitted with electric conveyors and gravity spouts teeming from heights of from 33 ft. 6 in. to 43 ft. 6 in. The depth of water is 25 ft. at low spring tides. In addition to these, there are 16 private staiths belonging to individual colliery companies, all with river berths.

THE TYNE'S LEAD IN INDUSTRY.

While these magnificent facilities were in process of being provided, and to some extent in consequence of them, the industrial development of the river proceeded apace. Tyneside had the advantage of a lead in all the characteristic developments of the nineteenth century. In a coal era, it possessed a great coalfield, the first in the world to be worked on a large scale, and the mining and export of coal assumed proportions uncontemplated in pre-Victorian days. With the invention of the locomotive by George Stephenson, the North of England led the way in railway development, and with the railway, coal became a still more valuable asset to the district. When in the fifties of last century, rail-borne coal from the new Yorkshire coalfield threatened the Tyne's trade in sea-borne coal with London, Sir Charles Mark Palmer built the first screw collier, and therewith, at a stroke, saved the North Country coal trade and established iron shipbuilding as a permanent and progressive industry on Tyneside. Meanwhile, the Tyne engineers who were first in the field as locomotive builders were steadily developing a marine engineering industry by fitting steam engines in tug-boats and paddle steamers, and had no difficulty in adapting themselves to the screw steamship when the John Bowes paved the way for the great fleet of steam colliers which followed. Thus, marine engineering kept pace with iron steamship building and both grew together. Iron shipbuilding in turn gave a new impetus to the iron industry, and iron furnaces and plate mills were established on the banks of the river. While all this was in progress, Lord Armstrong's invention of the Armstrong gun converted his small hydraulic engineering works at Elswick into a great armament and warship-building establishment, which was to become famous throughout the world. Later, the Tyne took the lead in building oil tankers and constructing floating docks, which added new branches to the shipbuilding industry. Later still, Sir Charles Parsons's invention of the steam turbine brought about a development in marine engineering in which the Tyne again took the lead, further enhancing its industrial resources and reputation.

Thus, the locomotive and the railway, the steamship and the marine engine, the coal trade and the iron industry, all moved forward together, and found in the steadily improving facilities of the river and port of Tyne the outlet they required for the world trade which the North of England was building up.

SHIPPING TRAFFIC.

Meanwhile, the needs of a rapidly growing industrial population had to be met. The import trade of the river grew with its exports, and steamship services to all parts of the world took away coal and valuable manufactures, to return with grain and food stuffs, and raw materials for the factories and workshops, while a great steam trawling industry brought fish to the Tyne and distributed it over England as far as London. It all meant traffic, and the traffic kept pace with the river's improving facilities. One way and another, few ports in Britain are busier than the Tyne. Up to 15,000 sea-going vessels, excluding tug- and fishing-boats, with a net register tonnage of over 12,000,000 tons, use the port in the course of a year, and the ships are of every variety, for they include not only the usual traders, but also ocean liners, warships and tankers fresh from the builders' yards, and all kinds of vessels which come to the river's dry docks for repair and overhaul.

THE COAL TRADE.

It is well understood that the industrial greatness of the Tyne has been built up on coal. More than anything else the Tyne is a great coal port. The area of the North East Coast, of which the river Tyne is the chief artery, comprises the oldest worked coalfield in Great Britain. It is believed that the Monks of Tynemouth Priory mined and shipped coal from the Haven as far back as 1269, and in 1245 it is recorded that Henry III granted a charter to mine coal in Newcastle, while in the fourteenth century, Newcastle coal was known in London and had reached France. By the sixteenth century, a regular export trade was in existence. In the reign of Charles I, there was a great demand for Tyne coal in London, and we find from the official report of the Trinity House, Newcastle, that the exports in 1703 amounted to 48,000 "Newcastle Chaldrons" (53 cwt.).

The Tyne possesses the great advantage of having the Northumberland steam coalfield on the one hand and the Durham bituminous coalfield on the other. The steam coal is of a quality once supreme in the country and now yielding place only to the richer seams of Yorkshire and South Wales, while Durham gas and coking coals have no rival for their gas-making and coke-producing qualities, and Tyne bunkers are always in favour with steamship owners because they give excellent steaming results at a low price.

Thus, while Northumberland steam coal is a staple export because of its quality and cheapness, Durham gas coal is used not only by London and many of the large English cities, but also by the leading gas companies on the Continent for gas-making purposes. Further, Durham coking coal, so largely used on the spot for making the well-known brands of Durham coke, is exported in huge quantities to Europe to be used for coke-making purposes there. Again, Durham bunker coals are to be found at all the coaling stations on the chief trade routes in company with Welsh coals, and at many of the North Sea and Baltic ports, where Welsh coal cannot readily compete.

Finally, certain seams of both coalfields produce excellent house coal. "Tyne Main coal" and "best Wallsend" are still highly popular brands in the Metropolis, and the centuries-old trade which the Tyne does with London and the South Coast towns in "sea coal," as it used to be termed, shows little sign of succumbing to the competition to which it is subjected from Yorkshire and the Midlands.

The Tyne is also the main outlet for the large quantities of Durham patent-oven and foundry coke which are sent overseas and to home ports. The fact that in 1929, the quantity of coke shipped from the Tyne amounted to over 1,000,000 tons is significant of the growth of this trade, for it is far and away the largest tonnage of coke shipped from any port in Great Britain, being indeed about one-fourth of the total quantity exported from the country. The largest quantity ever shipped from the river was in 1923, when a total of 1,385,651 tons was recorded.

The leisurely growth which marked the output and export of coal up to early Victorian times was enormously quickened by the advent of the railway and the steamship, the latter involving a rapid development of the coal bunkering trade, which has become a distinctive feature. Before the middle of last century, in sailing-ship days, the coal export trade of the river had grown to about 5¼ million tons a year. But between then and now, thanks to modern facilities and continual speeding up that quantity has been quadrupled, the shipments in a normal pre-war year being up to 20 million tons, while in 1923 the recovery of the trade after the War was so rapid that 21½ million tons were sent away and a new record was established. Unfortunately, during the post-War depression which followed, there was some reaction, but 1929 came near to the 20 million tons standard, with 19,730,591 tons of coal and coke to its credit.

Shipbuilding.

The Tyne is a very old shipbuilding centre, and in sailing-ship days built not only collier brigs, but also East Indiamen like the Blenheim. The builders of wooden sailing ships found the change from wood to iron and steel and from sail to steam comparatively easy, for after George Stephenson's railway successes locomotive building became an established industry at Stephenson's and Hawthorn's works in Newcastle and there quickly followed the fitting of wooden tug-boats with the new steam propelling-engine. A few iron vessels were built in the 'forties, but it was the building of the first screw collier, John Bowes, in 1852 that established iron shipbuilding on the banks of the Tyne. The demand for iron steam-driven colliers grew rapidly. Ere the industry was a quarter of a century old, there were a dozen iron shipyards on the river, many of which, no longer "tramp" builders, have since achieved a world-wide reputation for turning out naval and mercantile vessels of the largest size and the highest class.

Such growth has attended the shipbuilding industry of the river

AERIAL VIEW OF L.N.E.R., TYNE DOCK AND RIVER TYNE.

[*Photo: Chronicle, Newcastle.*

that up to half a million tons gross of shipping of every type have been turned out in one year, or equal in a good year to one-fourth of the total tonnage output of the country. There are to-day 15 shipbuilding firms on the Tyne, whose yards contain 96 building slips of all sizes, while many of the establishments include engine works for the production of their marine machinery.

The Tyne claims Sir W. G. Armstrong, Whitworth & Co., Limited (now known as Sir W. G. Armstrong, Whitworth & Co. (Engineers), Limited, and Sir W. G. Armstrong, Whitworth & Co. (Shipbuilders), Limited), whose great arsenal at Elswick, over a mile long, has supplied warships, guns and munitions to the four quarters of the globe, and whose naval dockyard at Walker (now owned by Vickers-Armstrongs, Limited), with berths up to 1,100 ft. long, has built battleships and cruisers of the power and fame of the Queen Mary, the Agincourt, the Malaya, and the Nelson. Also at Wallsend there are the yards of Swan, Hunter & Wigham Richardson, Limited, one of England's largest producers of shipping, who in a record year have turned out 127,000 tons gross, and who built the Mauretania and many other famous liners, as well as the largest floating docks the world has seen; and at Jarrow there is Palmers, whose blast-furnaces, steel mills, shipyard and engine works form one of the most self-contained establishments in the country, and whose record of naval shipbuilding is second only to that of Elswick. Among Tyneside engineering firms there are also R. & W. Hawthorn, Leslie & Co., Limited, the Wallsend Slipway and Engineering Company, Limited, the North Eastern Marine Engineering Company, Limited, and Parsons' Marine Steam Turbine Company, Limited, all great establishments which take rank among the very largest producers of naval and merchant ship machinery in the world.

Ship Repairing.

By reason of its geographical situation on the North Sea and its cheap bunker coal, the Tyne has specialised in dry-docking and ship-repairing. It is well known as a cheap repairing centre. Most of the shipbuilding firms have laid themselves out to execute repairs afloat, and several of them have dry docks on their premises. As the work of deepening and enlarging the river was carried out by the Tyne Improvement Commission, new dry docks of constantly increasing size were added to accommodate the larger ships using the port. Moreover, the great establishments of Armstrongs and Palmers have always been at the disposal of the Admiralty and foreign governments for naval and armament overhauls, while the lead given by the Tyne in oil tanker construction brings a constant stream of tank vessels for repairs.

To-day there are 28 dry docks, one floating dock, two pontoon docks, and 12 slipways and gridirons on the river. Many of the docks are capable of accommodating large vessels, one at least up to 700 ft. in length, but more dry docks of that size are now needed, and with characteristic enterprise, are about to be provided.

During the War the great Admiralty floating dock, which had been previously built on the Tyne, was transferred from Sheerness to Jarrow Slake, and once it was installed there, crippled battleships and cruisers from the North Sea Fleet kept it busy until the War ended. This dock, together with the several private shipbuilding and dry-docking establishments, was responsible for refitting no fewer than 2,750 naval vessels, including the Lion and the Tiger, besides repairing a much greater number of torpedoed and war-damaged merchant vessels of all types.

Oil Bunkering.

In keeping with the times, the Tyne is an oil bunkering port of prime importance on the East Coast. No prejudice in favour of coal has prevented the river from extending its bunkering facilities to oil. The large oil installations in the port with berths alongside for the discharge or bunkering of vessels, comprise those of Shell-Mex, Limited, and the British Petroleum Company, Limited, at Jarrow, of the British Mexican Petroleum Company, Limited, at the Lawe, South Shields, and of the Anglo-American Oil Company, Limited, at Elswick. At Jarrow Slake, a deep-water river berth, 600 ft. in length, having a depth of 30 ft. at L.W.O.S.T., has been provided for the discharge and storage of petroleum spirit, kerosene, fuel oil and other oils. The berth is so arranged that an additional berth can be provided, if necessary, at some future date. There is now in the port tank capacity for about 69,000 tons of all classes of oil, the quantity imported during the year 1929 being 120,624 tons.

In addition to the oil installations in the Port, self-propelled oilers are used on the river for the purpose of delivering bunker fuel to oil tankers or other vessels. There is also a special barge available on the river for oil-separating purposes. Further, two or three of the larger dry docks on the river have been fitted with adjoining storage tanks for holding bunker oil from vessels undergoing repair, the oil being returned to them when ready for sea.

Future Development.

Though so much has been done, it cannot be said that even yet the work of making the Tyne a great port has been wholly completed. New times bring new demands, and to be completely up to date, the Tyne must have more room for larger ships, larger dry or floating docks, and more quay space. It has long been the dream of Tynesiders to turn that waste of water known as Jarrow Slake to account for this purpose. Lord Kirkley, the Chairman of the Tyne Improvement Commission, has had a project of the kind in view and has received the support of the Commissioners for it, but so far, cost has stood in the way. Such an undertaking necessitates Government help and it looks now as though this is about to be forthcoming under the schemes of national development for the employment of labour which the Government has in hand. A subsidy would enable the work to be started during the present time of depression, for the scheme is already in outline and there can be no question that Jarrow Slake has ideal possibilities of development. It covers an area of over 100 acres, lies about three miles from the sea and is easily accessible from the river entrance. Its deepening would provide practically a natural dock of large dimensions, with room for extensive quay frontage, deep-water berths and also for a large floating dock for repair work. Jarrow Slake proved its advantages during the War; they remain to be adapted to purposes of peace.

R. W. Johnson.

CHAPTER XIX.

The Italian Merchant Marine.

To measure adequately the efficiency attained and the high place reached by Italy among the merchant navies of the world, it is desirable to run lightly over the past. For this purpose, it is not necessary to refer to the remote age of the maritime republics and their brilliant expansion in the Mediterranean; it will be enough to go back to the last century and to the merchant navies of the little States into which Italy was divided before political unity was attained in 1870.

Even some ten years before that time the workers at the numerous small wood shipbuilding yards scattered along the Italian coast were utilising the excellent timber, hemp and flax which the soil placed at their disposal. Among them were distinguished those of Liguria and of the two Sicilies, who devoted themselves to transoceanic trade. The former were specially partial to South America, both the Atlantic and the Pacific coasts; the latter preferred to frequent the ports of the United States. This state of affairs lasted for some years after 1870. Italian shipping, which had been second only to that of the United Kingdom, continued, however, to be made up mainly of sailing vessels. Its steam tonnage, which had slowly increased from 10,220 tons net in 1862 to 32,100 in 1870 (against 643,940 tons and 980,064 tons respectively of sailing ships), was composed even in 1875 of 54,147 tons of steamers against 987,190 tons of sailing ships.

Herein was the germ of the decadence which soon set in—a decadence which was inevitable because the displacement of sail by steam had scarcely affected Italian shipping. This was due not to lack of foresight on the part of shipowners, but almost entirely to the natural obstacles which the new iron construction encountered in a country devoid of iron and coal like Italy, where the iron and mechanical industries were making their first faltering steps and were unable to supply iron plates, engines, etc., which had to be imported from abroad. It may be added that shipowning in Italy still continued to be a family affair, so that the transformation into big firms, by the development of joint-stock companies, which took place during that time in more up-to-date merchant navies, found Italian shipowning interests unprepared owing to lack of circulating capital. Furthermore, the economic conditions of Italy in those days were backward and depressed.

The transformation from sail increased all over the world after 1875, and its effects were speedily felt in Italy, where home shipbuilding declined from 90,693 tons net in 1870 to 9,945 in 1885.

At the same time Italian tonnage decreased from 1,044,337 tons net in 1875 to 953,419 tons in 1885. This quantity included an enormous preponderance of sailing vessels, as steamers had only gradually reached a total tonnage of 124,600.

But once again the traditional sailor spirit of the nation and the enterprise of the shipowners were displayed. The latter were able, even with inadequate State aid, to react to the situation, and reconstituted a merchant navy which at the beginning of the War had regained a notable position in the world with a gross tonnage of 1,668,296. As in the interim modern shipyards had been created in Italy, a part of this fleet was of home construction.

THE POST-WAR PERIOD.

The vicissitudes of the post-War period are well known. The merchant marine came out of the conflict in 1918 reduced to 880,658 tons gross. Entirely from war causes it had lost 897,917 tons of mechanically propelled ships and 104,314 tons of sailing vessels, but whether as a result of new construction in the national shipyards, or by means of large purchases abroad (119 steamers of 732,346 tons gross in the three years 1919–1921), or by reason of the ships of the Venezia Giulia which were handed over to the various shipowners, by June 30, 1922, there were 1,418 mechanically propelled ships with a tonnage of 2,698,722. This fleet was not homogeneous and its efficiency was poor; the ex-enemy vessels which became part of it certainly did not add to its quality (especially as regards the big passenger ships, the Moltke, König Albert, etc.). A considerable proportion of the new acquisitions, about 400,000 tons, was made up of ships hurriedly built during the War, and some of them were of wood. Even the best of them had been subjected to intense wear and tear during the struggle.

Hence modernisation of material was urgent, but 1922 saw the beginning of the freight depression which does not yet seem to have reached rock bottom. This depression had the greater effect on the Italian mercantile marine because of the discord, which had become chronic, between shipowners and seamen. This state of affairs was part of the general demoralisation of the nation resulting from the influx of the " red " tide, but the seafaring folk were among the most violent in the work of shattering the foundations of the national life. Incited by their leaders they succeeded, by a series of agreements they always violated, in wresting from the shipowners new labour conditions and new rates of pay which were absolutely incompatible with the normal business of shipping. The shipowners were not backed up by the State and were obliged to give in, but they, in turn, endeavoured unceasingly to obtain financial assistance from the Government. Afloat, there was no discipline, because the sailor's mentality had been upset by easily earned wages, by the application of a levelling formula—" everybody equal, from the captain to the cabin boy "—and by the mirage of the handing over of the ships to the crews. A continuous series of strikes and stoppages served not only to support the new demands but also as a protest against the punishments inflicted by superiors upon inferiors, regarded as systematically unfair.

The effects of this flood of hate were not long in showing themselves. During 1922 more than 800,000 tons of shipping were laid up. The shipyard production which had been intense (133,190 and 170,348 tons gross were launched in 1920 and 1921 respectively) declined, owing to lack of orders, to 101,177 tons in 1922; no new vessels were laid down during the year, while construction already in hand was abandoned or suspended in many yards, so that launchings were rapidly reduced to 66,523 tons in 1923.

The Position in 1930.

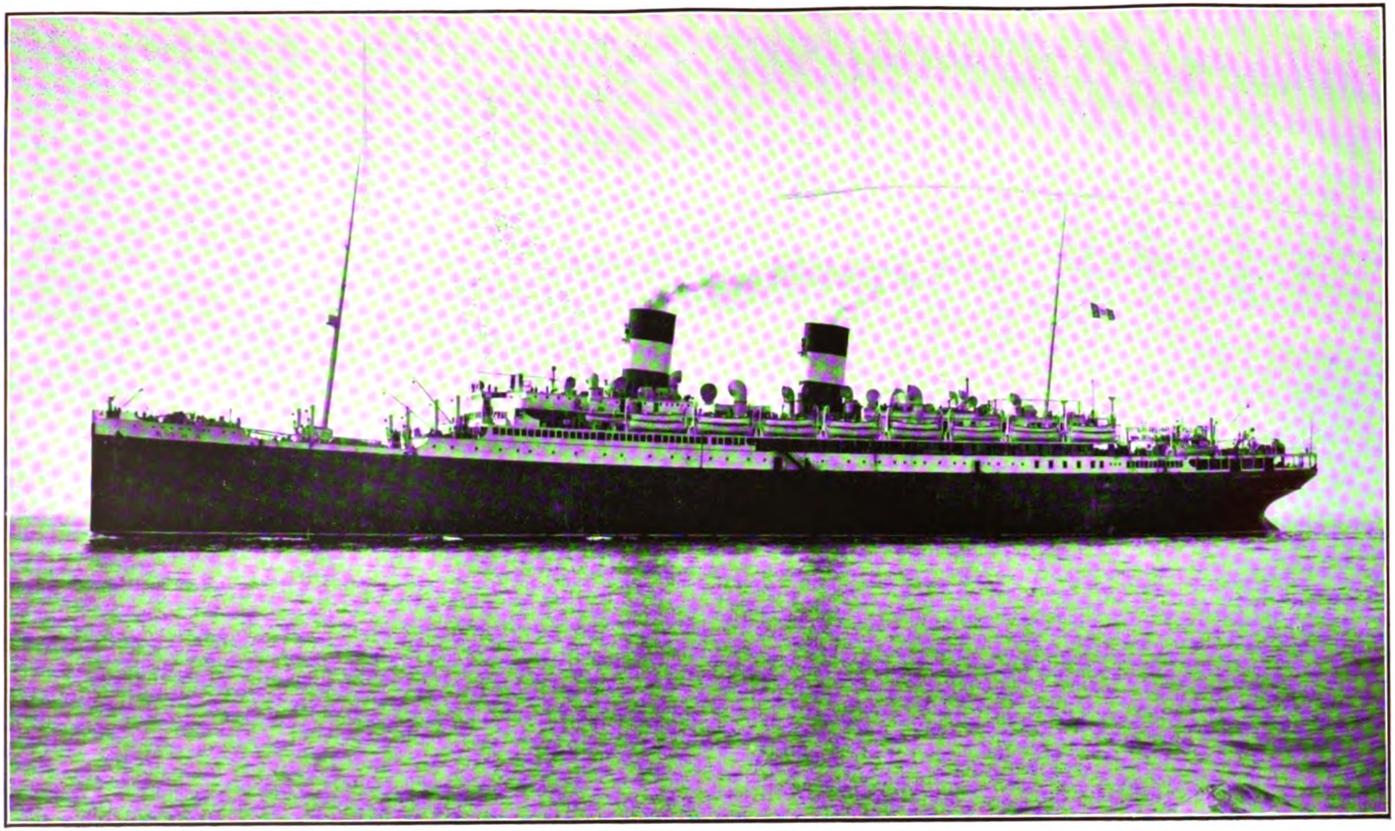
But Italy has repeatedly shown that she is able to rise again after a fall, on the solid foundation of the Roman virtues of order and discipline. The March on Rome in 1922 restored national well-being. As a result all the national activities revived and among them the mercantile marine, which in June, 1930, was seen as a homogeneous and effective whole. The tonnage figures increased from 2,698,722 gross, mechanically propelled, in June, 1922, to 3,261,922 tons in June, 1930—a percentage increase of 20·86, and an increase of 128 per cent. on 1914, when there were only 1,430,475 tons.

With the increase in quantity there was a corresponding improvement in quality. The average tonnage per unit, which was 2,656 tons in 1922, rose to 2,951 tons in 1930. Among the ships existing in 1922 there were only ten over 10,000 tons gross, with a total of 160,000 tons, and only one, the Giulio Cesare, exceeding 20,000 tons; in 1930 there were seventeen with a total of 329,801 tons, including eight of over 20,000 tons (Augustus, Conte Biancamano, Conte Grande, Duilio, Giulio Cesare, Roma, Saturnia and Vulcania). Against seventeen tankers of 51,118 tons in 1922 there were sixty of 256,666 tons in 1930; against twenty-five ships of more than 15 knots, tonnage 218,342, there were thirty-four of 379,616 tons; against eighteen motorships of 56,209 tons there were 173 of 511,367 tons. It may be noted that motorships have been introduced on the subsidised services, particularly those maintaining communication with the larger islands, Sicily and Sardinia, and that all have speeds superior not only to those formerly found on the lines in question but also to those specified in the contracts for the subsidy. During the eight years of reorganisation the Italian merchant marine set itself to keep abreast of technical development, and in certain respects was even able to take the lead.

The progress of Italian shipping may be illustrated from a statistical study carried out by an impartial observer, Sven Helander. He has divided world tonnage into three main categories:—

I. Ships of not less than 5,000 tons gross, speed 12 knots, not over 25 years old.

II. Ships of not less than 10,000 tons gross, speed 12 knots, not over 10 years old.



NAVIGAZIONE GENERALE ITALIANA'S S.S. ROMA.

(Builders, Ansaldo Societá Anonima, Sestri Ponente.)

III. Ships of not less than 15,000 tons gross, speed 18 knots, not over 5 years old.

In the following table the percentage of Italian shipping in the three categories is shown in relation to world tonnage :—

	1914.	1920.	1925.	1926.	1927.	1928.	1929.
I.	2·38	3·26	4·48	4·53	4·83	5.26	5·02
II.	—	6·28	6·09	6·58	5·99	9·03	10·53
III.	—	23·12	20·68	27·44	27·59	41·07	32·86

It may be remarked that in 1929 Italy occupied the seventh place in world shipping in the first category, but was second (after the United Kingdom) in the second and third categories.

The advance which has been made, especially in recent years, is shown even more clearly by the following table, in which the high-class ships appear as a percentage of the total Italian tonnage :—

	1914.	1927.	1928.	1929.
I.	13·36	18·11	20·87	21·28
II.	—	3 72	6·42	8·57
III.	—	2 43	4·57	4·97

The quality of the ships will continue to improve in consequence of various regulations which have been or are being made. By a decree of 1926 the Government entrusted the Registro Italiano exclusively with the important function of inspection. Classification is obligatory for all ships engaged in passenger traffic and for those less than 20 years old engaged in cargo traffic outside the Mediterranean, and the Registro's surveyors supervise the construction, whether in Italy or abroad, of Italian passenger ships and of cargo ships laid down in our yards. Regulations approved by the Government in 1928 render compulsory the observance of various rules for the safety of ships in regard to such matters as subdivision, stability and the provision of safety appliances. In 1925 the Committees of Inquiry sitting in the larger ports to investigate maritime accidents had been strengthened by increasing the number of technical members and in other ways.

An important provision for the technical improvement of ships is the formation of a Board for the construction and working at Rome of an experimental tank, which was inaugurated in 1929. With a length of 275 metres, a breadth of 12·50 metres, and a depth of 6·30 metres, the tank holds 18,000 cubic metres of water. Ship models can be tested up to a length of 8 metres, and models of propellers with a diameter of 50 cm. The tank is about to be furnished with an apparatus for producing in the direction of its length regular trochoidal waves, in order to permit the determination of the resistance encountered by the hull of a vessel when moving against them. A small tank with adjustable walls is also to be constructed for the study of the movements of ships in rough seas. Another decree of 1929 fixes the bounties payable for ships, calculated on the highest speed reached and the efficiency of their motive appliances. The result will probably be to increase the number of Italian ships with a speed exceeding 14 knots.

MARITIME POLICY.

In a recent speech the Duce, expounding again an old idea of his, declared that he regarded as the "healthy industries" only those which "find their work in agriculture and on the sea." The importance of the maritime problem has indeed been recognised by the new Government ever since it took office. By good fortune there was found at once in Costanzo Ciano, the hero of Cortellazzo, of Buccari and of other warlike exploits, the person capable of solving it. A daring sailor and soldier, he was to prove himself in peace time a well-balanced statesman, and from experience accumulated during a lifetime spent on the sea he was able to appreciate the realities of the problem and to seek a solution with energy and tenacity.

At the close of 1922 the most pressing problem was the restoration of order, to give back to shipping, to trade, and to shipbuilding that confidence which constitutes the principal element of prosperity. Hence the principle of authority on board ship was speedily re-established, and the Italian sailor regained the sense of discipline and of duty to his country. Various regulations, several dating back to early in 1923, purged the personnel by temporarily debarring men guilty of various crimes from serving as seamen, or in extreme cases by striking their names off the register. To compensate for the heavy responsibilities placed upon the crews, great care has been taken to safeguard their interests and rights, and all the agreements relating to maritime work reached at Geneva have been ratified without delay and brought into force. Besides arrangements for the minor grades, steps have been taken since 1928 to facilitate the finding of suitable employment for officers. The system of pensions known as the Cassa Invalidi was re-instituted in 1930, and in some cases double the former amounts of pension are granted. Hygiene, food, and working conditions on board are closely watched by the Harbour Authorities by means of periodical and rigorous inspections of ships in port. Attention has also been given to professional education by establishing the Nazario Sauro Board for carrying on a training ship for cadets of the mercantile marine, and by supporting nautical schools for the lower grades and extending their sphere of usefulness.

The shipbuilding problem was simplified by the Ciano decree of 1926, by which shipyards are enabled to avail themselves of the foreign metal market at every favourable opportunity, by being allowed to import the necessary metal duty free within certain limits of weight for every ton of gross measurement, e.g.480 kg. in the case of hulls above 1,000 tons. To builders making use of materials of home production there are granted customs bounties, and they also receive the building bounties.

As the purchase of material on a large scale requires also a considerable amount of available capital, which was not easily obtainable in the money market, there was founded in 1928 an Institute of Naval Credit which placed a milliard lire at the disposal of the shipbuilding industry. This institute grants loans, guaranteed by mortgages, up to 60 per cent. of the value of the ships offered as guarantee. Interest is charged at the market rate, less a quota varying from 1 per cent. to 2½ per cent., which is paid by the Treasury.

These arrangements may cause some people to overrate or rather to exaggerate the importance of State assistance to the Italian merchant marine, and the question merits a little examination. Shipbuilding is an industrial activity quite distinct from shipowning, and the prices charged by foreign shipyards constitute a limit for Italian constructors, so that the shipowner, in buying ships built in Italy, does not gain any advantage as a result of the bounties given to the shipbuilders. On the other hand, the Customs bounties, more than the shipbuilding industry, protect the metal industry, which is a key industry for the life and defence of the nation. The shipbuilding bounties, however, seek to place our shipyards on a level with foreign yards, always taking into account that Italian industry is burdened in comparison with foreign industry by higher costs owing to transport of metal material and fuel and by the higher price of money, and, among other things, it is more heavily taxed. The characteristic of present legislation, however, consists in the fact that it departs from the usual protective systems in so far as it seeks to stimulate initiative, not to lull it to sleep. In fact, by granting greater freedom for the import of materials for the construction of larger ships, by encouraging internal-combustion motor apparatus as compared with steam engines, and by fixing for complete engines an increasing scale of bounties in direct relation to the diminution of consumption of fuel, Italy has provided a very active stimulus to technical progress.

As regards the Naval Credit, is it really a case of protection in view of the greatly superior facilities offered by other States? As to subsidies, other countries—for example, the United Kingdom and the United States—declare that they do not grant them in the absolute sense but only postal subsidies, which are to be regarded solely as payment for services rendered. The former expends some £800,000 a year, the latter $28,000,000. The subsidies in Italy must all be looked upon as postal in character, since the transport of postal matter in ships employed on subsidised services is done entirely free. As a result of the system of subsidised services inaugurated by Italy in 1926, the total expenditure, which in 1922 was 300,000,000 lire, has been appreciably reduced. The appropriation for 1930–31 is actually 154,427,409 lire for indispensable services and 64,550,000 for those of public utility. The former include the shipping lines between the mainland and the islands, the local services between Trieste and Istria, and the lines between Italy and the Colonies, the Dodecanese, Libia, Eritrea and Somaliland. On these services there is no discrimination in favour of the Italian flag. Protection can only work in the international field in order to prevent foreign preponderance from destroying the national merchant marine or in order to encourage the latter to extend its radius of action. While our indispensable lines are subsidised only because there is insufficient trade to make them attractive to private national initiative, they respond almost uniquely to the necessities of internal policy.

The lines which are of public utility maintain such services as those to Northern Europe, Spain, Algeria, Morocco, the Levant, Egypt, India the Far East, and North America. In these lines it may be admitted that there is innate a certain element of protection, but it must not be forgotten that national industry receives the greater advantage as it is enabled the more easily to compete with foreign rivals. In any case the amount involved is relatively small, especially in view of the fact that a total of 400,000 tons of shipping is in question and a yearly aggregate of about 3,400,000 miles. It should be added that the Treasury contribution is being reduced year by year.

RATIONALISATION.

It is not correct, therefore, to speak of excessive Government assistance in Italy. It should be noted, instead, that in maritime matters the Government has often deliberately refrained from asserting its own wishes. An example is to be found in connection with rationalisation. Abroad rationalisation has seemed to be regarded as a panacea for all the industrial ills in the world, not excluding maritime. In Italy an attitude of good-natured expectancy has appeared preferable and sometimes a cautious initiative, so that the normal processes of concentration have been left to the free play of the vital forces of industrial organisation. The Government has not encouraged, or rather assisted, except in well-defined cases, such as when a business of outstanding industrial and national importance showed signs of being able to recover, if wisely assisted, from a derangement which might be assumed to be temporary.

In this connection it is worth recording that in 1922 there was laid before the Chamber a Bill proposing the reduction of the productive capacity of the shipyards, by withdrawing all protection from establishments considered as redundant by a special consortium of shipbuilders, with a view to the elimination or transformation of such concerns. This was, of course, on similar lines to the new National Shipbuilders' Security of the United Kingdom, but the Italian project asked for the financial assistance of the State for such purposes as completing ships already under construction and transforming cargo craft into ships for passengers and cargo. The Government, however, did not perceive any obligation on its part to improve situations compromised by the inability or shortsightedness of the undertakers, and the Bill fell through.

In 1929, however, moral support was given to the Odero-Terni-Orlando combine on account of its public utility. This combine was the result of the fusion of the Cantieri Navali Odero, the Odero-Terni and the Cantieri Navali Orlando. A further recent example is the Cantieri Riuniti dell' Adriatico resulting from the fusion of the Stabilimento Tecnico Triestino and the Cantiere Navale Triestino di Monfalcone (and hence also of the Cantiere San Rocco). These yards proceeded to a general revision of stock values, and, after writing down shares, to a suitable increase of capital (150 millions).

These cases of rationalisation have increased the efficiency of the respective companies. Other important Italian shipbuilding concerns are the Cantieri Ansaldo of Genoa-Sestri, those of Riva-Trigoso, the shipyards of Palermo and Ancona, the Partenopei at Naples, the Tosi at Taranto, and the Breda at Mestre. The former Cantiere della Foce has been closed. The Italian machine shops now produce marine machinery of the most modern types. The Fiat works at Turin have formed a special department for the manufacture of their type of two-stroke single-acting marine motor, and the Savoia works at Genoa Cornigliano have been equipped for the construction of high-power combustion engines. There are also the electro-mechanical workshops of the Cantieri dell' Adriatico, where all the electric machinery for the Venezia Giulia's motorships has been produced as well as for a large number of the ships built in other Italian yards. Italian constructive industry has emancipated itself from that of foreign countries. The biggest transatlantic liners are now being built in Italy, and Italian shipyards have gained notable successes in building to the order of foreign owners. In the latter connection it may be mentioned that fifty-one ships of various tonnages were built between 1926 and 1930 by the Cantiere di Monfalcone, which has recently obtained, without any State aid except the Customs freedom, a contract for two tankers of 16,500 tons d.w. for the Standard Oil Company.

Activities and Problems.

The transatlantic passenger service, maintained by the Navigazione Generale Italiana, the Lloyd Sabaudo and the Cosulich Companies, is now in a satisfactory state generally. On the seven big foreign lines which unite Northern Europe to North America there are conveyed annually 230,000 first- and second-class passengers; on the three Italian lines from the Mediterranean to North America 45,000. The services to the United States were affected by the change in the emigration policy, so that at first traffic under the Italian flag decreased considerably; now, owing to the quality of the ships and the excellence of the services, there has been a recovery and the traffic has increased. The third-class traffic in Italian ships to South America also increased in 1929 to the extent of about 40 per cent. of the total of third-class emigration from Europe. The Italian companies have been able to develop their specialised organisation for traffic to foreign countries. An example is the Lithuanian emigration *via* Genoa to South America, in connection with which they have established a joint organisation in Lithuania.

To keep pace with competition in the North Atlantic trade, the Italian transatlantic service has improved its ships and perfected its organisation. The Navigazione Generale has sold or broken up seven steamers, and the Sabaudo three. In the second half of 1932 there will be added to the ten big transatlantic liners (total 246,381 gross tons, including the two Cosulich) now in service, two 50,000-ton units, the Rex and the Conte di Savoia, which with a speed of 27 knots will be able to perform the voyage from Italy to New York in seven days. It must be repeated that the Italian transatlantic services do not receive any subsidy. The only assistance from which they obtain any benefit consists in the partial financing of new construction by the Naval Credit Institute. To present a united front to foreign competition the three companies in 1928 formed a pool and came to a working agreement for maintaining services with pre-arranged itineraries and for sharing the profits on an agreed basis.

The Navigazione Generale Italiana has increased its capital since 1922 from 150,000,000 to 600,000,000 lire. At the end of 1929 its fleet was somewhat smaller (having decreased from 199,158 tons gross to 168,629), but was more efficient as it was composed of seven large transatlantic liners, two passenger and cargo steamers, and one tanker.

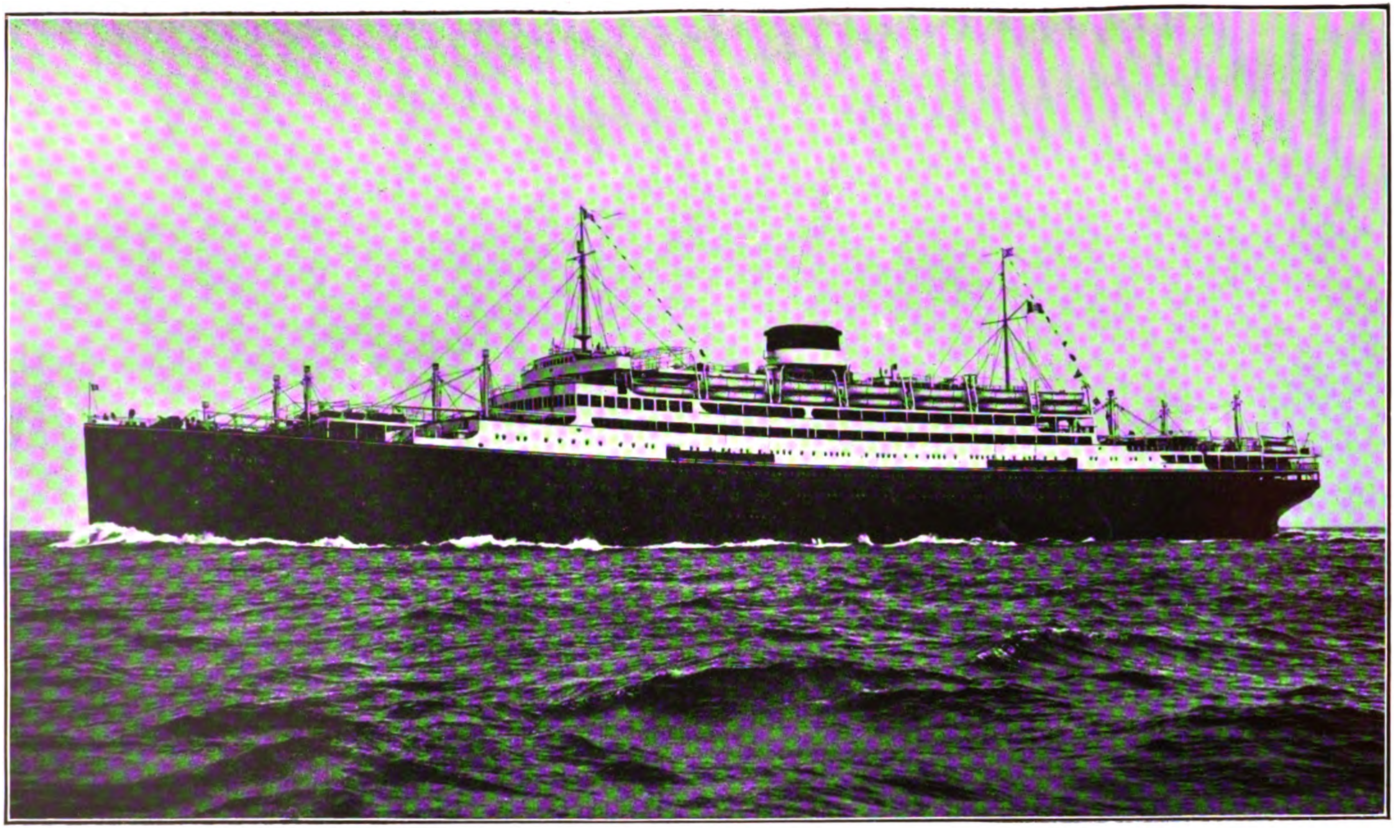
The Lloyd Sabaudo increased its capital in the same period from 150,000,000 to 250,000,000 lire. In 1930 the fleet had increased from 83,701 to 119,489 tons; it is composed of the four "Conte" ships, two transatlantic liners (Principessa Giovanna and Principessa Maria of 8,500 tons), and two cargo steamers.

The Cosulich has increased its capital from 60,000,000 to 400,000,000 lire; the fleet is reduced (18 ships of 148,000 tons at present), but has become more homogeneous. It includes the two liners Saturnia and Vulcania.

It should be added that the service to Australia is not in a flourishing condition on account of the emigration restrictions introduced by the Australian Government. The passenger movement has increased on the lines to Central America and the South Pacific, via Panama.

Repeated references have been made to the subsidised lines: it will be sufficient to say that the 52 units (of 170,000 gross tonnage) which, as agreed in the 1926 and later conventions, were to be added to these lines, are now nearly all ready or in course of completion. On January 1, 1926, there were on these services 99 ships of 181,931 tons, with an average of 1,838 tons; on January 1, 1929, there were 196 ships of 547,211 tons, with an average of 2,792 tons.

Among the subsidised lines, the Lloyd Triestino increased its capital, in the years 1922–1929, from 28,000,000 to 150,000,000 lire, and renewed about a quarter of the fleet, which amounts to about 200,000 tons gross. The company is building a fast motorship of 14,000 tons, the Cleopatra, which will be placed on the Alexandria service. The Sitmar (Societa Italiana Servizi Marittimi) has increased its capital from 10,000,000 to 40,000,000 lire; the fleet has increased only slightly (66,117 tons at present), but it is rejuvenated and now contains the Ausonia of 12,994 tons gross and 21,253 i.h.p., which with the Esperia of similar dimensions performs the fast service between Genoa and Alexandria. Among other subsidised companies are the Citra (Compagnia Italiana Trans-



COSULICH LINE'S M.S. VULCANIA.

(*Builders, Cantiere Navale Triestino, Monfalcone.*)

atlantica) with a capital of 60,000,000 lire and a fleet of 18 steamers and four motorships of 137,570 tons; the Florio, 50,000,000 lire capital and 68,000 tons, including 13 of the latest motorships; the Veneziana di Navigazione a Vapore, capital 20,000,000 lire, with a fleet of 13 vessels of 66,346 tons gross; and the Marittima Italiana, capital 9,000,000 lire, fleet six ships of 39,467 tons.

The owners of cargo-liners suffer from the same troubles as embarrass the regular foreign lines. Among new services are the fortnightly Tirreno-Levante-Danubio of the Genovese di Navigazione a Vapore of Genoa; the Genova-Lisbona-Oporto of the Neptunia of Genoa; the Meridionale of Naples line to the Plate, and the fast Italia-Sud Africa of the Libera Triestina of Trieste.

Like others the Italian tramp owners have been suffering from the world depression in freights, but the number of vessels laid up is not excessive. They do not possess so large a proportion of old ships as is sometimes said; yet experience demonstrates that the old ship, in a period of economic crisis, has its advantages and renders good service. Statistics given by one of the most experienced Italian shipowners show that the age of ships has no appreciable effect on total losses. In speaking of age it is also necessary to consider the state of preservation, and Italian shipping, subjected to rigid surveillance and continuous and very strict inspection, is in an excellent condition. The process of renewal, of course, continues, but it is not thought economically prudent nor financially possible to hasten it having regard to the shortage of capital and the high price of money.

The growing tonnage, the constant urge towards quality, and the resultant increase of efficiency, are reflected in the larger preponderance that the Italian flag is assuming in the traffic in the Italian ports. In 1922 the Italian proportion was 59 per cent.; in 1929 it had reached 70 per cent. The amount of traffic at the ports increased from 23,479,917 tons in 1922 to 39,268,155 tons in 1929.

The Italian merchant marine does not aspire to predominance nor to hegemony; it desires only to live and prosper, and to contribute its share to the development of trade and world progress. The Italian population is constantly increasing, but as everywhere barriers are being raised against emigration there is no possibility of finding increasing employment except on Italian soil and in Italian industry. The cultivable areas of the country, however, are not unlimited, and the Italian soil is poor, while her industry in general finds obstacles in the almost entire lack of the raw materials which Nature has furnished in abundance to other countries. The only resource left open to Italy without let or hindrance and full of possibility is the sea. The mercantile marine, with the special industries connected with or dependent on it, constitutes such an instrument of labour and such a fountain of activity that the first place in the economic life of Italy must be assigned to it. Further, the Italian cargo fleet, besides supporting the export industries, has the task of assuring the country its supplies, of which the greatest part comes by sea. In 1929, out of a total of over 39,000,000 tons of goods embarked and disembarked at Italian ports, more than 29,000,000 tons arrived from or were dispatched to foreign ports. The quantity of merchandise crossing the frontiers by rail was only about a third of this amount (10,000,000 tons in the fiscal year 1928–1929). Additional emphasis is given to the fundamental importance of the mercantile marine by the nature of the commodities transported by sea—heavy goods and those essential to human life and to national industry (such as grain, coal, oil-seeds, cotton, phosphates, metal ores, liquid fuel) which generally are imported from oversea either for geographical reasons or because of the efficiency and cheapness of sea-transport.

The judgment passed by Candace is perfectly correct: "La politique maritime italienne s'est caractérisée essentiellement, au cours des dernières années, par son esprit d'entreprise et d'initiative à tout prix."

GIUSEPPE FORTINI,
Capitano di Porto.

CHAPTER XX.

MERCANTILE MARINE MACHINERY.

It has frequently been observed in all industries that, during periods of depression, manufacturers of machinery have been stimulated, by lack of demand for their wares, or through non-absorption of their products, to put forward intensive efforts to effect improvements in the design of their plant, and users of such wares to secure higher economy of operation in their employment. This attitude has been particularly noticeable during the prolonged inactivity of the shipping industry which has, unfortunately, been experienced in all the maritime countries during the last few years, the dearth of profitable employment for ships, with the almost entire absence of inquiries for second-hand obsolescent vessels, having naturally been reflected in the reduction of demand for new tonnage and its propelling machinery.

As was shown in the last issue of this " Annual," the desire to attain better technical results, and thereby reasonable returns on invested capital, caused manufacturers and owners to respond strongly to the urge provided by this stimulus. During the past twelve months, however, there has been a partial reaction, and, with a few outstanding exceptions, technical and commercial progress in marine machinery has been neither so pronounced nor so continuous as it was in the previous year. It is much to be regretted that owners generally are not availing themselves of the substantial advances in fuel economy open to them to anything like the extent which it was naturally justifiable to expect. In many cases the modernisation or reconstruction of existing uneconomical plants to this end is, apart from an initial moderate outlay, quite unattended by financial risk, as there are now on the market appliances with a long record of proved value, which will enable owners to carry a much larger tonnage of cargo at a higher speed and on the same fuel bill. It is rather surprising that with such facilities at their disposal there should be so large a proportion of otherwise enterprising shipowners who, apparently, have not so far seriously considered the adoption of these modern aids to efficiency.

The preceding remarks apply more particularly to steam engines, and especially to those of the reciprocating type, with which the larger proportion of existing tonnage susceptible of improvement is fitted ; but certain items of dividend-improving equipment can be applied to all vessels, whatever the nature of their prime movers, and it is sincerely to be hoped that further serious consideration will be accorded by owners to such modifications to their ships' machinery, from the point of view both of their own pecuniary advantage and of meeting foreign competition and thus advancing the prosperity of the country.

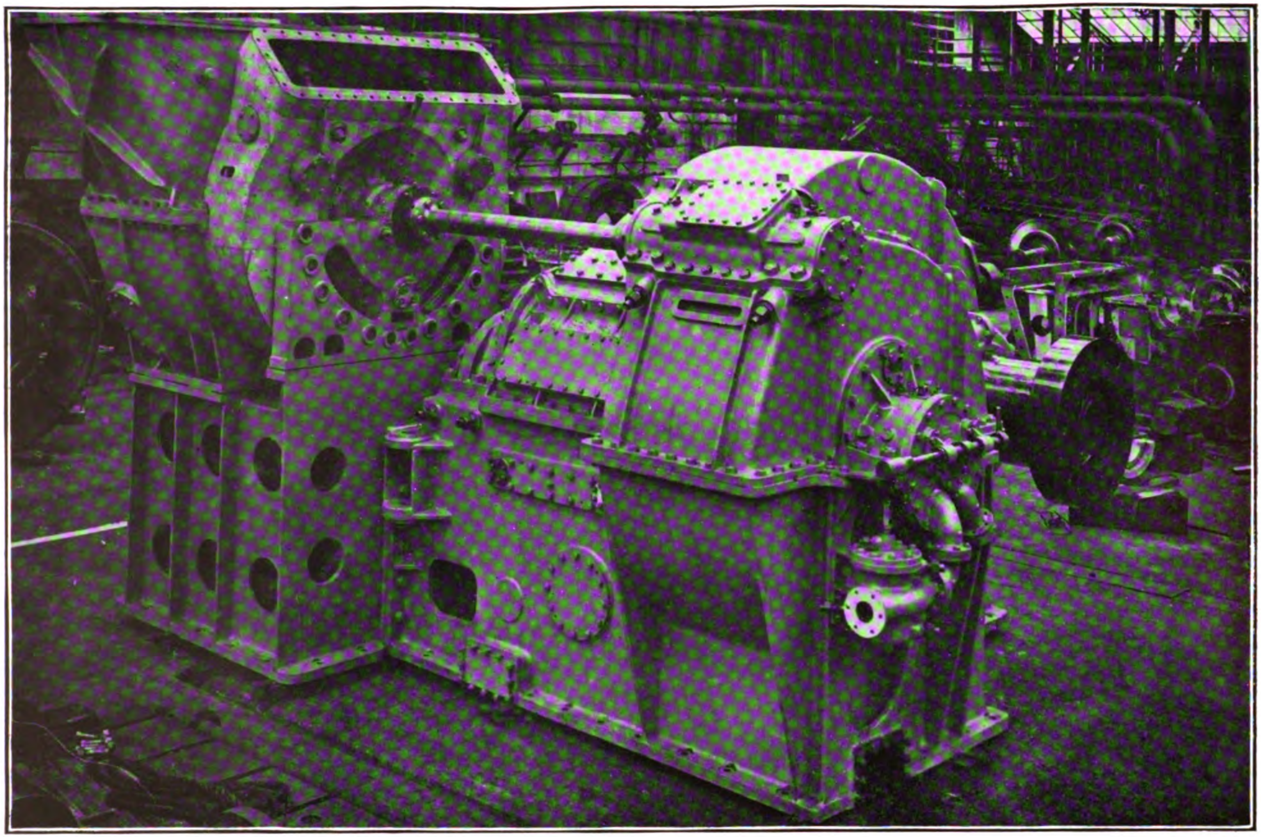
HIGH-PRESSURE STEAM.

Possibly the lack of demand for moderate and large-size vessels of the liner class has produced the impression that the successes recorded in 1928 with the employment of water-tube boilers operating at 350–400 lb. pressure and at a temperature of 600–650 deg. F. were only transient, and not likely to be maintained. Such reports as are available have, however, shown that these ships are continuing to show the good results obtained during their early voyages, and the few new liners since ordered, including two for the P. & O. Company and the new Cunarder, are to have boilers operating at similar pressures and temperatures. As is well known, the Norddeutscher Lloyd liner Europa, which in the early part of the year broke the Bremen's record by achieving 28 knots on her maiden voyage, has boilers working at 330 lb. pressure.

It is understood that the Cunard Company are fitting twenty-four Yarrow type water-tube boilers in their new vessel, in association with geared turbines on four shafts, while the new P. & O. ships, Strathnaver and Strathaird, which are to be improvements on the Viceroy of India (and of greater power), are also having boilers of the Yarrow type, one set being built by Messrs. Vickers-Armstrongs, and the other by Messrs. Yarrow. They are to be oil-burning with side firing, the arrangement adopted in the latest C.P.R. " Empress " Class vessels, one of which, the Empress of Japan, was put into service in June. The Mid-Ocean, the new Furness-Withy luxury ship for the New York–West Indies traffic, will also have water-tube boilers but of the Babcock type, operating at 400 lb., the same pressure as has been adopted in the reconstructed machinery of the " Albert Ballin " Class of the Hamburg–Amerika Line, in which it is reported that the very high boiler efficiency of 90 per cent. has been obtained. In the new Italian liners for the Lloyd Sabaudo and the Navigazione Generale Italiano, and in the new Compagnie Générale Transatlantique's liner La Paix, the boiler pressure is to be the same, and this figure appears, for the present, to be standardised for vessels in this category.

The last of the large vessels in hand for the C.P.R., the Empress of Britain, which was launched in June, is to have similar high-pressure steam generating plant, and is being fitted with one water-tube boiler to the design of Mr. J. Johnson, the Chief Superintendent Engineer of the Company, the remainder being of the Yarrow type. A similar but smaller Johnson boiler has been installed in the Princess Hélène, a smaller turbine-driven vessel built by Messrs. Denny for the C.P.R.'s Bay-of-Fundy Service.

In practically all cases of cross-channel steamers, of which several were ordered or finished during the year, geared turbine drive with steam generated in Scotch boilers at 200–250 lb. pressure is adhered to, though as regards steam pressure the new Dover–



EXHAUST STEAM TURBINE AND GEAR FOR 7,000-H.P. STEAMER.

(Constructed by Messrs. W. Beardmore & Co., Dalmuir.)

Ostend steamer Princess Astrid, built by Messrs. Cockerill, is an exception, having Babcock and Wilcox boilers working at 390 lb. per sq. in. The French Calais–Dover boat, Côte d'Azur, and her sister, the Côte d'Argent, the G.W. Railway Company's St. Patrick, the Lady of Mann for the Isle of Man service, the Hook of Holland boats Vienna, Prague and Amsterdam, and the latest Stranraer–Larne boat by Messrs. Denny, all have single-reduction geared turbines, a type of engine which may now be said to have become standardised for fast cross-channel work. Two exceptions, however, are the Venus for the Bergen–Newcastle service and the Innisfallen for the Fishguard–Cork service, both of which are fitted with airless injection trunk piston Burmeister and Wain oil engines similar to those recently completed in the Ulster Prince and her sisters on the Liverpool–Belfast route.

ELECTRICAL PROPULSION.

In last year's article a recrudescence of interest was noted in the use of electrical means of transmitting the energy developed by the prime mover to the propeller, and it is understood that the principal vessel therein cited, the Viceroy of India, continues to give great satisfaction to her owners, so much so that orders have been entrusted to Messrs. Vickers-Armstrongs for two further vessels of larger horse-power, with propelling machinery of the same type. A full account of the performance of the Viceroy of India was given in a paper read to the Institution of Naval Architects in April last by Mr. W. J. Belsey, of the British Thomson-Houston Company, the firm responsible for her electrical equipment. The Mid-Ocean, ordered by Messrs. Furness Withy & Co., is also to have quadruple-screw turbo-electric machinery, the electrical plant in this instance being supplied by the General Electric Company, and a smaller vessel for the Union Company of New Zealand, in which two widely separated normal speeds are called for—a condition for which the electric drive is admirably fitted—was recently ordered, also from Messrs. Vickers-Armstrongs.

Of more moderately powered vessels, the Musa by Messrs. Workman Clark and the Platano by Messrs. Cammell Laird & Co., of about 7,000 s.h.p. with British Thomson-Houston electrical equipment, are in service; both are fitted with Scotch boilers working at fairly high pressure. The Darien, *ex* La Marea, which was converted from Diesel-electric to steam-electric by Messrs. Workman Clark, now has Babcock and Wilcox high-pressure boilers. All these vessels are fruit carriers having very considerable refrigerating machinery, which constitutes a heavy electrical load during the voyage in one direction.

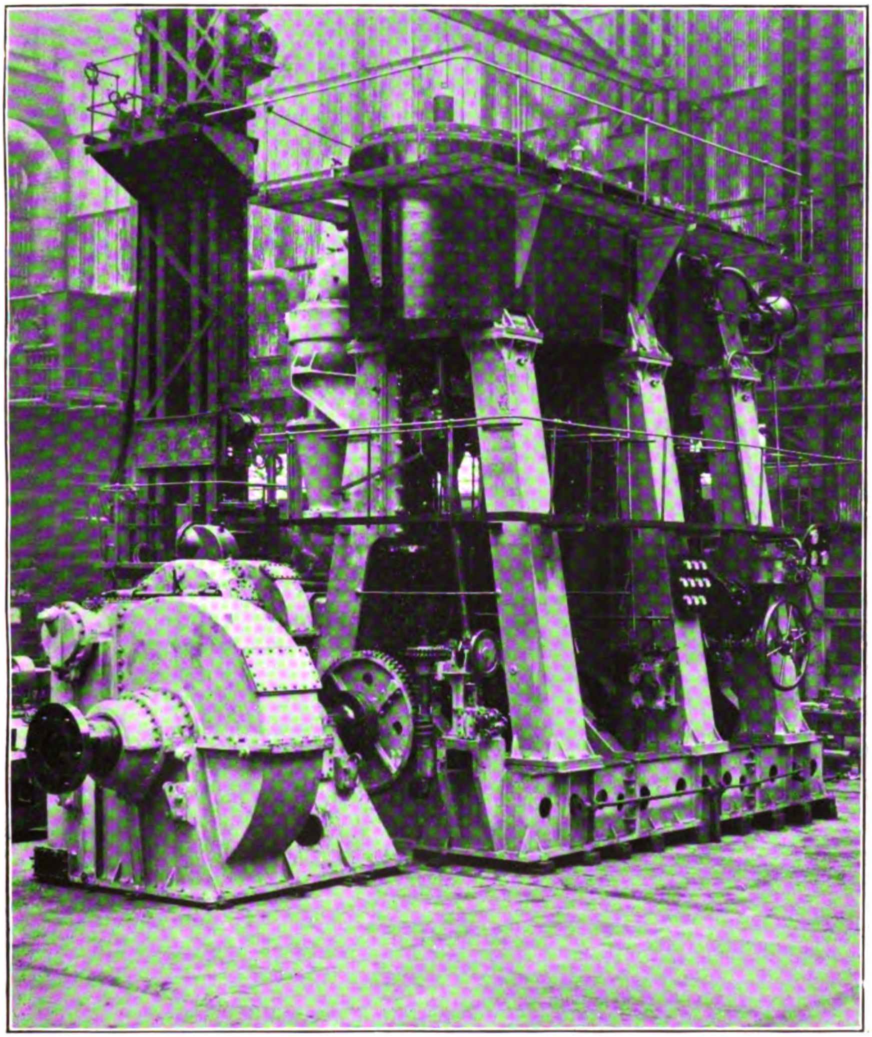
An interesting vessel in which electrical transmission has been installed is the Cement Karrier, a craft specially designed for the transport in bulk of cement in powdered form. Her machinery comprises two Atlas-Polar 500 b.h.p. Diesel generators driving a single 775 b.h.p. direct-current motor on the propeller shaft, and also the elaborate cement-discharging machinery. The electrical equipment, furnished by the General Electric Company, has a Ward-Leonard system of control capable of being operated from the navigating bridge if desired.

In America the electrical system retains its popularity, some notable vessels in hand or recently finished being the Santa Clara of 12,600 s.h.p. by the New York Shipbuilding Company for the Grace Line, six vessels of 10,500 s.h.p. each for the United Fruit Company, four vessels of 12,000 s.h.p. each for the Panama Line, and the Morro Castle of 16,000 s.h.p. for the Ward Line. Many other small American craft have been and are being equipped with electric drive in conjunction with Diesel engines, this being the most popular form of propulsion in the United States for tugs, ferry-boats, and the like.

While the above list makes quite an imposing array, there are many owners who have not yet been converted to a belief in the electrical form of transmission, and it is noteworthy that neither Italy nor Germany has adopted the electric drive for any vessel of importance. The new Cunarder, and all the new Continental liners, including the Bremen and Europa and the " Albert Ballin " Class in Germany, and the two large liners building in Italy, are fitted with single-reduction gears, following the lead of the C.P.R. in this country with their " Duchess " and " Empress " Classes, having high-pressure oil-fired water-tube boilers with high superheat and arranged for maximum economy at one speed only. Consumption figures published for the Empress of Japan—0·603 lb. of oil fuel per s.h.p. hour for all purposes and 0·552 lb. for propelling purposes—give an overall thermal efficiency of 24 per cent., and it is anticipated that this result will be surpassed by the Empress of Britain when she goes into service this year. The figures should be compared with those given to the Institution of Naval Architects for the Viceroy of India by Mr. Belsey in the paper already referred to. In the case of those transatlantic ships in which large speed variation is not called for and ports of call are few, the case for electrical propulsion is not so attractive as it is, for instance, in ships engaged in the Eastern and Australian trade or the American coastal services, where considerable variations of speed are necessary and high economy for long runs at lower speed than the maximum is essential.

EXHAUST STEAM TURBINES.

The remarkable rise in popularity of the exhaust-steam turbine, operating in conjunction with reciprocating engines on the Bauer-Wach system, was commented upon in last year's article. This system continues to find favour to an ever-increasing extent, as is shown by its application to a large number of both new and existing vessels. As was naturally to be expected from the success attained, competitive designs have been evolved, but so far the number of ships equipped with these alternative schemes has been relatively small. It was mentioned that the P. & O. Company, which had previously fitted five of their " B " Class vessels with the Bauer-Wach system with great success, had decided to instal similar plant



ENGINE AND EXHAUST STEAM TURBINE AND GEAR,
S.SS. DALHANNA AND DALDORCH.
(Constructed by Messrs. W. Beardmore & Co., Dalmuir.)

in a larger vessel, the Comorin of 13,000 i.h.p. This alteration has been completed, and a set has also been put into the same company's Ranchi of 16,500 i.h.p., while the Razmak (now Monowai), Chitral, and Maloja, the last of 17,500 i.h.p., were undergoing conversion in the latter part of the year. The Clan Line have also recognised the value of the system, and have a number of vessels in course of having the equipment fitted, over and above many already in service, while amongst other British companies that have adopted the plant are the Nourse Line, Ellerman Line, Hain Line, Booth Line, and Blue Star Line, all of which have ordered Bauer-Wach equipment during the past twelve months. The total number of vessels fitted is now approaching 200. There are, however, still many owners of vessels to which the system could be advantageously applied who do not seem yet to have seriously considered the substantial gains accruing from its employment.

Of competing systems working in association with non-electrical transmission, it is understood that the Parsons design has been applied to one American vessel, and one set is in hand in this country for the Constantine interests. Three sets of the Brown-Boveri type have also been ordered. Another alternative scheme in which the exhaust steam is fed to a turbo generator delivering its current to a motor on the propeller shaft has been fitted to some of the " City " ships of the Ellerman Lines—the Hong-Kong, Singapore, Mandalay, Canberra, and Canterbury, and also in conjunction with Caprotti valve gear to the engines of the Barcelona. All the generators of these vessels produce direct current, but the P. & O. Company have fitted alternating current generators in the Mooltan, their solitary conversion to this system. The electrical equipments have been supplied by the Metropolitan-Vickers Company for the d.c. sets and by the British Thomson-Houston Company for the a.c. plant.

Notwithstanding the great success already achieved, continuous and intensive development work still proceeds with a view to improving, simplifying, and cheapening the cost of these exhaust turbine equipments, the success of which has probably been the outstanding feature in the development of marine steam engineering during the last decade.

As examples of the most recent design of the Bauer-Wach system, two photographs, taken in the works of the engine builders, Messrs. William Beardmore & Co.—are reproduced facing pages 232 and this page. The first is of one of the largest exhaust turbine plants yet built, the turbine and engine together giving 7,800 i.h.p. on a single screw. The second shows the combined engine, turbine and gear as fitted in two cargo carriers of the latest type—the Dalhanna and Daldorch, which are of 8,800 tons dead-weight carrying capacity. On trials these vessels, fully loaded, achieved a mean speed at sea of over 11 knots on a coal consumption of 24½ tons a day, equivalent to 1·16 lb. of Welsh coal per i.h.p. hour, with Scotch boilers of 200 lb. pressure and without superheat. This result represents an improvement of over 20 per cent. on the consumption of a sister vessel fitted with similar reciprocating engines, but not equipped with the exhaust-steam turbine, and is by no means an isolated case of excellent performance, as the many vessels now in service are fully justifying the claims for economy made by the designers.

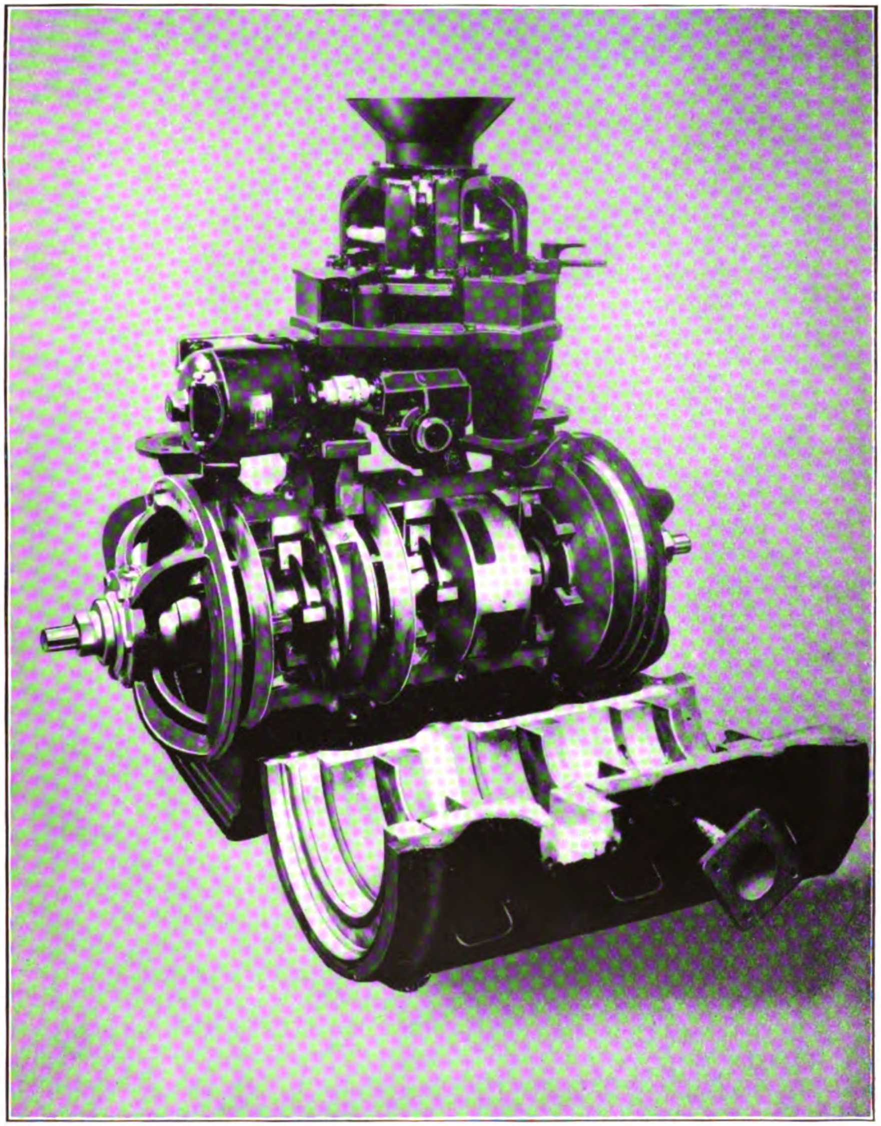
Coal Burning Equipments.

Probably owing to the accentuated lull in shipbuilding (in Europe particularly) little has been heard during the past twelve months of developments in the mechanical delivery of coal to boilers, whether in the lump or the powdered form. This statement is not intended to imply that progress has ceased. On the contrary, continuous research work has been, and is still being, prosecuted.

It is true that some of the earlier installations—particularly those using powdered fuel—have required modification to suit conditions which have arisen, and which could only be ascertained definitely on service, it not being possible to foresee them in the design stage. This state of affairs, however, was only to be expected. The burning of powdered fuel in marine boilers is only in its infancy, and it will be recalled that the history of the early days of fuel oil burning shows that similar serious and prolonged difficulties were encountered in the course of the necessary pioneer work. That complete technical success will be ultimately achieved is scarcely to be doubted, but possibly commercial considerations as to initial cost, and the dearth of experienced personnel for operation, will tend to delay somewhat the widespread adoption which may reasonably be anticipated. Judging from the rapidly extending use of pulverised fuel and mechanical stokers on stationary boilers, it would appear not unreasonable to predict a corresponding progress afloat, as soon as all the onerous conditions associated with marine work can be successfully met.

An interesting example of a powdered fuel equipment, the first of its kind in a British ship, is one installed in the Furness-Withy-Johnson liner Incemore. This plant is on the Todd unit system which has also been applied to the American cargo steamer West Alsek. The Incemore, which has been converted for the purpose, has three three-furnace Scotch boilers, and for each of these three boilers a separate mill is provided, each mill being fitted with three two-stage beaters, so that there is a separate feeder pipe with its own unit for each of the nine furnaces. This arrangement surmounts the distribution difficulties which gave great trouble in earlier plants, particularly with Scotch boilers in which the independent furnaces and combustion chambers are of relatively small dimensions. In the Incemore the mill—of which a photograph is shown facing this page—together with the necessary fan is driven by a steam turbine. Electric motors could be substituted if preferred, but the steam turbine arrangement avoids demand for electric power from the ship's generators, which in a conversion job are usually of insufficient size to cope with the extra demand for the pulverisers. It is claimed that a plant of 22½ b.h.p. per ton of coal per hour powdered is all that is necessary.

Messrs. Babcock and Wilcox have carried out experiments on a considerable scale, and have had under test at their Renfrew works



TODD TRIPLEX PULVERISING MILL.

a water-tube boiler of the design fitted in the Clyde steamer King George V, operated by a pulverised fuel plant of their own design.

Messrs. Clarke, Chapman & Co., who fitted the pulverised fuel equipment to the Berwindlea—which is understood to be giving every satisfaction—and to the Harrison liner Musician, are also manufacturing several further sets, including one for a new Harrison ship at Birkenhead.

INTERNAL COMBUSTION ENGINES.

Of a total tonnage of about $1\frac{1}{8}$ millions under construction in this country at the end of September, 57 per cent. consisted of motor ships and 43 per cent. of steamers, whilst in other countries there was a total of $1\frac{1}{2}$ millions, of which 63 per cent. was motor ships. If this world total of $2\frac{5}{8}$ millions is compared with that of about $5\frac{1}{2}$ millions in 1921—made up of 5 millions of steam and $\frac{1}{2}$ million of motor ships—it will be observed that while the total tonnage under construction was little less than half of that of nine years ago, the volume of motor tonnage had increased three times, and the steam tonnage had been reduced to one-fifth of what it was at the earlier date. This remarkable state of affairs is very largely due to the extensive application of Diesel engines to oil tankers, for which they are undoubtedly very suitable, since these vessels have long uninterrupted runs and obtain their propelling fuel cheaply at the same sources as their cargoes. In September no fewer than 62 such vessels—29 of them for Norwegian owners—were under construction in Great Britain.

The application of the Diesel engine has, however, been extended to several large liners, and some notable examples were completed during the year. These included the White Star liner Britannic, with two double-acting four-stroke Harland B. and W. type engines, each with 10 cylinders and 1,000 b.h.p. per cylinder ; the Winchester Castle for the Union-Castle Company with similar eight-cylinder engines ; the Lafayette of the C.G.T. with four shafts, each with two-stroke six-cylinder M.A.N. engines of 4,500 s.h.p. ; the Marnix Van St. Aldegonde with two 10-cylinder Sulzer engines each of 7,000 s.h.p. ; and the Chichibu Maru with double-acting B. and W. design engines of a maximum power of 20,000 h.p.

For large equipments there are practically only three principal designs now employed, the Burmeister and Wain four-stroke double-acting, the Sulzer two-stroke single-acting, and the M.A.N. two- and four-stroke double-acting. For smaller craft, the Werkspoor, Fiat, Doxford, Polar, and Tosi are the chief designs which have found favour, though others have been used to a limited extent.

The application of supercharging, and of waste heat boilers fired with exhaust gases, has been a notable recent feature, and the research work that is being carried out by Messrs. Alfred Holt, who are applying the Buchi system to the Clytoneus and Maron and the Rateau system to the Agamemnon, should give very valuable comparative information, particularly as the first two ships have Messrs. Holt's own design of four-stroke single-acting engine, while the Agamemnon has the Burmeister and Wain type.

FUTURE OUTLOOK.

The depression which has recently clouded the shipbuilding and engineering industries and the uncertainty which prevails at the moment as to the possibility of an early revival tend to cause much hesitancy in formulating an estimate of the future development of marine machinery.

Type of Vessel.	Engines.	Auxiliaries.	Boilers.
Tramp steamers of cheapest class	Reciprocating	Steam-driven	Coal-fired Scotch
Tramp steamers of higher class and cargo liners (slow speed)	(1) Reciprocators with exhaust steam turbines.	Steam-driven	Coal-fired Scotch
	(2) Steam turbines (geared)	Steam-driven	Coal-fired Scotch
	(3) Diesels 2- or 4-stroke direct coupled	Steam or electric	Oil-fired vertical
High-class cargo liners (moderate speed) and intermediate passenger and cargo	(1) Reciprocators with exhaust turbines mechanical or electrical drive	Steam	Coal-fired Scotch
	(2) Diesels 2- or 4-stroke direct-coupled	Electric with Diesel generators	Oil-fired waste-heat type
	(3) Steam turbine geared	Steam	Oil-fired Scotch
Passenger steamers (moderate speed)	(1) Steam turbines	Steam and electric	High-pressure water-tube, oil-fired
	(2) Diesels 2- or 4-stroke direct coupled	Electric with Diesel generators	Oil-fired waste heat
	(3) Reciprocators with exhaust turbines	Steam	Oil-fired Scotch
High-speed passenger liners	(1) Steam turbines geared	Electric with Diesel generators	Water-tube high-pressure oil-fired
	(2) Turbo electric	Electric with steam generators	Water-tube high-pressure oil-fired
Cross-Channel steamers	(1) Steam turbines	Steam	Scotch or water-tube, normal pressure, oil-fired
	(2) Trunk piston Diesel engines fast running	Electric with Diesel generators	Waste-heat oil-fired
Tankers	(1) Diesel engines 2- or 4-stroke	Steam	Scotch oil and waste gas-fired
	(2) Reciprocating engines	Steam	Scotch oil-fired

Modifications and improvements in connection with existing machinery are being continuously thought out, but, in the absence of orders for new tonnage, have little or no chance of being immediately exploited. The indications are, however, that the methods of propulsion set out in the table on the opposite page are definitely crystallising. While this statement must be taken as approximate so far as the order is concerned, it would appear that there is not at present in the market any revolutionary proposal which will substantially alter the types now regarded as most suitable for the various classes stated. That details will be modified and improved in the course of time is certain, and in the case of reciprocating engines a definite tendency has already developed to displace the time-honoured slide valves by drop or poppet valves operated on one of the systems now available, such as the Lentz or Caprotti, the latter being fitted in the Ellerman liners City of Sydney and City of Barcelona.

For purely rotary prime movers the reaction principle is becoming more and more definitely established so far as main engines are concerned, but, curiously enough, the impulse design of turbine for auxiliary purposes continues to find favour.

In the internal combustion field there is every indication that superchargers will in due course become a standard part of the equipment, enabling higher mean pressures to be obtained without imposing undue stresses on the material.

Stabilisation, at any rate for a few years, will no doubt be very welcome to engineers, as their profession is practically the only one in which the present generation has had to learn its trade three times—first with reciprocators, then with turbines, and last with Diesels. The engineer of the present day has to be familiar with all three, and with their various combinations, and to have more than a smattering of electrical knowledge. In this connection it is most deplorable that present conditions are deterring the youth of the country from embarking in the engineering industry as a profession, either on land or on sea. The lack of apprentices entering the works and subsequently proceeding to sea as engineers, and the emigration of skilled tradesmen, are most serious matters from the national point of view, and their effects on the prosperity of an Empire whose fortunes are closely bound up with its sea-borne trade do not appear to receive the consideration they deserve.

R. J. BUTLER, M.I.N.A.

CHAPTER XXI.

NOTABLE MERCHANT SHIPS OF THE YEAR.

IN some ways the most interesting ship launched last year is the Pacific Steam Navigation Company's quadruple-screw motorship Reina del Pacifico. Building by Harland and Wolff, at Belfast, she is intended for the Liverpool, Chile, Peru, and West Coast of South America service of her owners. With a length of 550 ft., between perpendiculars, a breadth, moulded, of 76 ft., and a depth, moulded, of 44 ft., she has a gross tonnage of about 17,300 tons. Her service speed is 19 knots. She will prove a notable addition to the tonnage on the South American run. She will be the fastest, though not the largest, motorship serving South American ports, and very few steamers will make the passage between Europe and South America in shorter time than she is expected to require. Accommodation is to be provided for about 800 first-, second-, and third-class passengers, and will be of a high order. Her cargo-handling arrangements will also be of an up-to-date character, and electrical auxiliaries will be employed throughout.

The most noteworthy feature of the ship is her propelling machinery. This consists of four sets of 12-cylinder four-stroke cycle trunk-piston machinery aggregating 22,000 b.h.p. at 145 r.p.m. The engines are provided with airless injection and are supercharged on the Büchi principle. They are the largest and most powerful mercantile trunk-piston Diesel engines yet made, and the installation is the largest to which supercharging has been applied. Moreover, no mercantile Diesel engines have been built with a greater number of cylinders. The installation is further noteworthy because of the use that is made of the waste heat from the main and auxiliary engines. The exhausts from the four propelling engines are used first to drive the gas turbines which operate the two-stage supercharging blowers, and then 50 to 60 per cent. of them is directed through two large Clarkson waste-heat silencer boilers, capable of producing 8,000 lb. of steam an hour at a pressure of 100 lb. per sq. in. Alternative oil firing of the boilers is arranged for, when the evaporation will naturally be higher.

Electricity is to be extensively used in the engine-room, on deck, and in the service departments. No fewer than four 350-kw. Diesel generators are provided. Like the main machinery, these are a product of Messrs. Harland and Wolff's engine works. These large auxiliary engines are also airless-injection machines, and the exhaust gases from two of them are passed through a Clarkson boiler capable of producing 1,000 lb. of steam an hour.

This vessel can thus fairly be regarded as one of the most interesting motorships ever built. Supercharging raises the output of the main engines by 35 to 40 per cent.; the installation is the largest yet to employ airless injection; it is the most powerful supercharged plant yet fitted in a ship; and it is easily the largest trunk-piston installation ever built. It is worthy of note that because of the adoption of trunk pistons the height of the engines is much less than would otherwise have been the case. Headroom is at a premium in passenger ships, and it has often been urged against the adoption of double-acting Diesel engines of moderate speed that they require too much headroom. The Reina del Pacifico's installation is the first attempt on a large scale, without recourse to geared Diesels, to minimise the effect of engine height on the extent of the passenger decks amidships by adopting quick-running trunk-piston engines.

Along somewhat similar lines to those of the Reina del Pacifico's machinery is that adopted for the fast and powerful cross-channel motorship Venus, building in Denmark for the Newcastle–Bergen service. This 19-knot twin-screw ship is to have large trunk-piston machinery, totalling 10,000 b.h.p., in which supercharging and airless injection will also be employed. These engines are being built by Messrs. Burmeister and Wain at Copenhagen, and they are making use of engine-driven superchargers of a special type developed at Copenhagen. This is something of a novelty for large marine Diesel engines, and engineers are awaiting the completion of the ship with almost as much interest as they are the larger ship.

THE BREMEN AND EUROPA.

Some particulars of the Norddeutscher Lloyd liner Bremen were given in last year's "Annual," but her official principal particulars have since become available and are as follows: Length overall, 938 ft. (286·1 m.); length between perpendiculars, 888 ft. (270·7 m.); beam, moulded, 101 ft. 8 in. (31 m.); depth to D deck, 45 ft. 6½ in. (13·9 m.); maximum draught, 34 ft. (10·326 m.); deadweight capacity on 32-ft. draught, 9,500 metric tons; displacement on 32-ft. draught, 51,860 metric tons; loaded normal speed, 26¼ knots; loaded maximim speed, 27 knots. She can carry about 2,200 passengers—800 first-class, 500 second-class, 300 tourist class, and 600 third-class, with a crew of about 1,000.

The Europa is a sister ship to the Bremen, but the two vessels were built and engined by different firms, differ internally, and have quite different propelling machinery arrangements. So far as the machinery is concerned, the Bremen uses the now usual three-pinion arrangement of single-reduction geared turbines, such as has proved so successful in the Orontes, Empress of Japan, Statendam, and other notable vessels. The Europa, on the other hand, employs the Blohm and Voss "four-square" two-pinion layout, an arrangement which not a few engineers have criticised because of the high power that is transmitted by each pinion. So far, however, the arrangement has behaved excellently in service. The turbines of the Europa, it is interesting to note, were constructed under Parsons' licence, while those of the Bremen are of Dr. G. Bauer's own design. Both vessels make use of very large oil-fired water-tube boilers, the Bremen having eleven double-ended and nine single-ended boilers, while the Europa has twenty-four double-ended boilers. In both vessels the steam pressure is about 330 lb. per sq. in. and the temperature of the superheated steam about 660 deg. F. Diesel-driven electric generators are used in both ships. The Bremen has an Oertz streamline rudder; the rudder of her sister ship was designed by the builders of the vessel and is not of any patented type. Both ships have Frahm anti-rolling tanks and the Bremen has no bilge keels; the writer is not aware whether the Europa is the same in this respect, but it is known, in connection with the underwater form of the vessels, that their lines are different; the bulbous bow—a feature of the design of both ships that has caused much discussion—is fuller in the Europa than in her sister.

Two Geared Motorships.

There has recently been completed in Holland a most interesting motorship, the Rotterdam Lloyd's Kota Agoeng, which is propelled by two double-acting Diesels driving a single screw through Vulcan hydraulic couplings and single-reduction gearing. In the twin-screw passenger and cargo motorship Milwaukee, built in Germany last year, double-acting Diesel engines of somewhat similar type are employed in conjunction with single-reduction gearing. In this case, however, the hydraulic couplings are dispensed with and a simpler installation results. A sister ship, the St. Louis, is equipped with a geared Diesel installation of the same general type and power, but, as in the Dutch cargo ship, fluid couplings are interposed in the drive to protect the gear teeth from any torsional oscillation there may be in the system, and also to act as a shock absorber and "iron out" the relatively uneven torque of even two-stroke double-acting 6-cylinder engines. So effective is the Vulcan fluid coupling in this last respect that the classification societies have allowed the line shafting to be of the same size as for a turbine vessel, which makes for a useful saving of weight as compared with the slow-speed direct-coupled Diesel installation. Messrs. Blohm and Voss, Hamburg, have, however, developed the system that is used in the Milwaukee to a high pitch of practical utility, and its soundness has been demonstrated in such vessels as the Monte Sarmiento, the Monte Olivia, and the ill-fated Monte Cervantes. In these and other ships single-acting four-stroke cycle engines are used, and gearing troubles have not been encountered. With the better torque of the double-acting two-stroke cycle engine, the gearing should prove even more durable and quiet in operation. The Milwaukee, a vessel of 16,700 gross tons has four M.A.N. type engines (two per shaft) of 300 b.h.p. at 220 r.p.m. Each engine is directly coupled to a pinion shaft, and the speed of the propellers is 110 r.p.m. The engines are, of course, directly reversible. All controlling is carried out from a common station, as in the Kota Agoeng, in which, however, only two sets of controls are coupled up, against four in the case of the German liner.

The Kota Agoeng is a sister ship of the Kota Inten, Kota Gede, and Kota Tjandi, all built by Fijenoord, Rotterdam, and her principal dimensions are: Length between perpendiculars, 448 ft. 4 in.; beam, moulded, 60 ft. 6 in.; depth to the upper deck, 33 ft. 6 in.; draught to summer freeboard, 26 ft. 7¼ in.; deadweight capacity on summer free-board, 9,640 tons; gross tonnage, 7,331 tons; net tonnage, 4,600 tons. Compared with the other "Kota" class ships, her carrying capacity shows an increase of 140 tons, because of the decrease of engine weight consequent upon the adoption of geared Diesels in place of the slow-running direct-coupled machinery of the sister ships.

The ship has been built to the highest class of Lloyd's Register, and has three decks, with forecastle, bridge, poop, and promenade decks. She is provided with a Star contra-propeller and rudder, while the Kota Inten, Kota Gede, Kota Tjandi, and Kota Pinang have Oertz rudders. Intended primarily for the express cargo service to the Dutch East Indies, she has a service speed of over 14 knots. There is comfortable accommodation amidships for fourteen passengers, and in the 'tween decks about 1,300 Mecca pilgrims can be carried. The crew totals 55; the officers are housed in side deckhouses on the bridge, while the crew are berthed in the forecastle. The vessel has a double bottom, suitable for the carriage of oil fuel, cooling and drinking water, and water ballast. The hull is subdivided by eight watertight bulkheads into fore peak, holds Nos. 1 and 2, fore deep tank, engine room, after deep tank, holds Nos. 3 and 4, and after peak. The deep tanks are suitable for the carriage of edible oils. The freezing and cooling chambers are placed amidships, to starboard, on the upper deck. There are eleven 5-ton and four 3-ton winches, and two 2-ton cargo cranes. The cargo-handling gear is so arranged that both foremast and mainmast can deal with lifts up to 40 tons. All the deck machinery, including the steering gear and anchor windlass, is electrically driven.

The machinery differs from that of the sister ships, Kota Inten, Kota Gede, Kota Tjandi, and Kota Pinang, each of which is equipped with a 7-cylinder double-acting two-stroke cycle air-injection Fijenoord-M.A.N. Diesel engine of 5,200 b.h.p. at 86 r.p.m. Each main engine of the Kota Agoeng is a 5-cylinder directly-reversible double-acting two-stroke cycle Fijenoord-M.A.N. unit, developing 2,750 b.h.p. at 215 r.p.m. The output to the Vulcan gearing is normally 5,500 b.h.p., of which about 5 per cent. is absorbed in the hydraulic couplings and the single-reduction gearing, so that the power at the propeller shaft works out at 5,200 b.h.p. The speed is reduced to 86 r.p.m. in the gearing, and hence the power and r.p.m. characteristics are the same as in the other "Kota" ships. The cylinders have a bore of 520 mm. and a stroke of 700 mm., the brake mean effective pressure being 58·5 lb. per sq. in. The scavenging air pump and the air compressor are driven off the forward end of the crankshaft, and the main controls are at the forward end of each engine, being interconnected, as already explained. Two 200-kw. Diesel dynamos are installed.

The total weight of the engine installation compares very favourably with that of her sister ships, which are propelled by slow-speed engines of equal power, in spite of the larger number of auxiliaries required with the Vulcan gearing. The specific weight of the installation of the Kota Agoeng is about 385 lb. per s.h.p., while that of the sister ships is about 453 lb. per s.h.p., so that the latter is about 17 per cent. heavier than the geared installation. The Kota Agoeng is the first vessel of the Dutch merchant fleet to be propelled by high-speed Diesel engines combined with Vulcan gearing, and is the first single-screw ship to have such an arrangement with two-stroke-cycle double-acting engines.

The Empress of Britain.

Unquestionably one of the ships of the year is the Empress of Britain, launched on June 11 from the yard of Messrs. John Brown & Co., Clydebank, for the Southampton–Quebec service of Canadian Pacific Steamships, Limited. This vessel will be by far the largest ship in the Canadian passenger trade, and will set a new standard of travel to Canada and the western parts of the United States, her high speed of 24 knots making this route the fastest between this country and cities in the United States west of Chicago. She has a length of 730 ft. between perpendiculars, of 755 ft. on the load waterline, and of 758 ft. overall; a breadth, moulded, of 97 ft. 6 in.; a depth to B deck of 60 ft. 9 in.; a load draught of 32 ft.; and a gross tonnage of about 42,500. She is to have sufficient oil fuel capacity to enable her to make the round voyage from this country to Canada and back, with adequate port bunkers and an ample allowance for bad weather, etc. The cabin arrangements and standard of accommodation will, it is said, be unexcelled by any vessel afloat. Her immense beam permits cabins of large size, while her public rooms are most spacious and admirably arranged. Few, if any, ships afloat will afford greater area per passenger carried in regard to sleeping accommodation, social room space and promenading facilities. Her quadruple-screw machinery will be of the type installed in the Duchesses and the Empress of Japan, namely, high-pressure single-reduction Parsons-type geared turbines with water-tube boilers and Scotch boilers for supplying make-up feed and auxiliary steam. The Empress of Japan has returned the remarkable low specific fuel consumption of 0·603 lb. of oil per s.h.p. hour, and it is believed that the larger and more powerful quadruple-screw ship will improve upon this very fine result.

The Empress of Japan.

With a gross tonnage of 26,032 tons the Empress of Japan is the largest vessel yet built for the Canadian Pacific's transpacific service, in which she took her place last summer. Her builders were the Fairfield Shipbuilding and Engineering Company, Govan. Her length, overall, is 666 ft., her breadth at promenade deck 87 ft. 9 in., and her depth, moulded, to bridge deck 56 ft. 9 in., and her total complement is 1,752 persons, made up of 399 first-class, 164 second-class, 100 third-class, and 510 Asiatic steerage passengers, with

579 officers and crew. She has three funnels, straight stem, cruiser stern, and two pole masts, and is rigged as a fore-and-aft schooner. Her decorations and furnishings are most luxurious, and she is undoubtedly the most important addition that has been made to the transpacific service for many years. The propelling machinery consists of two sets of Parsons-type turbines driving the shafts through single-reduction gearing. High-pressure high-temperature steam is supplied by six Yarrow-type water-tube boilers burning oil fuel in open stokeholds under forced draught with preheated air. The main turbines can together develop 30,000 s.h.p. continuously at sea with one of the six main boilers in reserve; this power is capable of giving the vessel a speed of 21 knots, and it can be increased to over 33,000 s.h.p. for long periods should an increase of speed be necessary at any time. Electrical deck and engine-room auxiliaries are used, four 300 kw. Diesel generators being provided.

CANADIAN NATIONAL STEAMERS.

Three interesting steamers for the Canadian National Railway's service on the Pacific coast of Canada were completed last year at Birkenhead by Messrs. Cammell Laird & Co. The Prince Henry, Prince Robert, and Prince David are of striking appearance, with three funnels, a cruiser stern, and six decks. Their length, overall, is 384 ft. 6 in., breadth, moulded, 57 ft., depth, moulded, to main deck, 20 ft. 8 in., and load draught 16 ft. 6 in. The propelling machinery consists of two sets of Parsons three-pinion single-reduction geared impulse-reaction turbines manufactured by the builders. At full power they make 250 r.p.m. and are designed to give a service speed of 22½ knots. Steam for the main engines and auxiliaries is generated in six Yarrow water-tube boilers of the latest single-flow five-drum type with a working pressure of 350 lb. per sq. in., and is superheated about 170 deg. F. in Yarrow integral superheaters. As in the latest Canadian Pacific liners two Scotch boilers are provided for generating auxiliary steam and supplying make-up feed to the main system, according to the Johnson duplex boiler-feeding arrangement.

UNION-CASTLE MOTOR LINERS.

With the completion of the Winchester Castle, which was placed on the South African mail service during the autumn, the Union-Castle Line became the largest owners of passenger motorships in the world. The Winchester Castle is broadly the same as the Carnarvon Castle (completed in 1926) and is also a product of Messrs. Harland & Wolff's Belfast establishment. She has a length between perpendiculars of 630 ft., a breadth, moulded, of 75 ft., a depth, moulded, of 44 ft. 6 in., and a loaded draught of 32 ft. 1 in. The gross tonnage is 20,109 tons, the net 12,228 tons, the deadweight capacity about 13,000 tons, and the loaded displacement 30,173 tons. There is accommodation for 259 first-class, 243 second-class, and 254 third-class passengers. Like the Carnarvon Castle, she is propelled by two double-acting Harland-B. & W. four-stroke cycle engines of 13,000--14,000 s.h.p., which give a speed of 15¼ knots. Waste heat boilers are fitted ; the Carnarvon Castle is not provided with such fuel conserving equipment. The Warwick Castle, another motorship for the passenger and mail service to South Africa, was launched at Belfast last year. She is somewhat longer than the Winchester Castle, but otherwise the two ships are more or less the same.

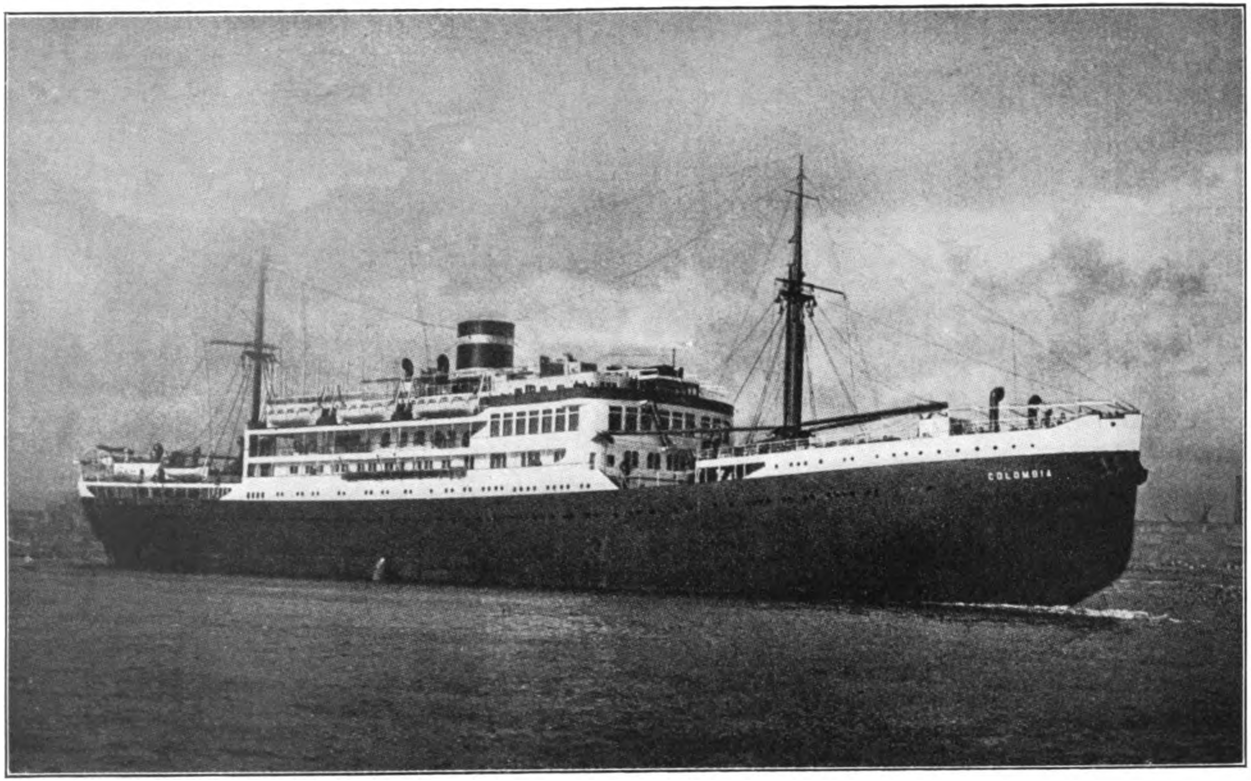
The Dunbar Castle, a notable motorship of the intermediate class, which was put into service by the Union-Castle Line in June last, had been preceded by the Llangibby Castle towards the end of 1929. Both vessels were built and engined by Messrs. Harland & Wolff, and are generally similar, though the Llangibby Castle (11,951 tons) has one more deck than the Dunbar Castle (10,002 tons). Both are well furnished and the cargo-handling facilities are excellent. In each case single-acting Harland B. and W. cross-head type air-injection engines, supercharged on the Büchi system, are employed for propulsion. There are waste heat boilers in both.

Among other motorships the White Star liner Britannic, to which reference was made in last year's edition of this "Annual," has proved a success in service, and the construction of a sister ship, which it is understood will be almost identical, is proceeding at Belfast. The Tuscan Star, the Blue Star Line's first motorship, was completed by Palmers Shipbuilding & Iron Company at Hebburn-on-Tyne last April. Of 11,450 tons gross, and 15 knots speed, she is the largest insulated ship afloat. She is doing well in the South American meat trade, and her Sulzer engines have enabled her to make some remarkably fast passages without any undue pressing of the machinery. The 18½ knot Dutch motor liner Baloeran is another notable ship with Sulzer engines, her two sets aggregating 14,000 b.h.p. She is 574 ft. in length, with a gross tonnage of 17,000, and has accommodation for 236 first-class, 280 second-class, 70 third-class, and 48 fourth-class passengers.

MAIER FORM PROGRESS.

The Maier hull form was applied to one or two vessels during the past year. One of the most interesting is the *de luxe* steamer Ile de Beauté, constructed at Bremen on account of reparations payments, which has been put on the Corsican services of the Fraissinet Company. She is intended for fast daylight crossings between Nice and Corsica, as well as for weekly cruises along the Côte d'Azur and around the island, and carries first and second-class passengers only. She is 338 ft. long, and is propelled by twin screws driven by two double-reduction Parsons-type geared turbines, each developing 3,000 s.h.p. Steam is generated by four Prudhon-Capus combined fire-tube and water-tube boilers fitted with superheaters and burning oil fuel. On trials her speed exceeded 20 knots. In appearance she resembles a graceful private yacht and her interior appointments are very luxurious.

Another notable Maier form vessel is the Dutch passenger and cargo motorship Colombia, which is propelled by two sets of eight-



ROYAL NETHERLANDS STEAMSHIP COMPANY'S M.S. COLOMBIA.

(*Builders, P. Smith, Jr., Rotterdam.*)

cylinder Werkspoor supercharged oil engines aggregating 8,000 b.h.p. The vessel is 457 ft. long by 61 ft. 6 in. broad, and has a gross tonnage of 9,000. The service speed is 15 knots and 180 first-class, 70 second-class, and 60 third-class passengers are carried. The Colombia was built by P. Smit, Jr., Rotterdam, for the Royal Netherlands Steamship Company and is that company's first large motorship. She is fitted with twin rudders.

TWO CROSS-CHANNEL STEAMERS.

Last spring the Southern Railway Company placed in service the Denny-built cross-Channel steamer Isle of Jersey and her sister ship the Isle of Guernsey. With an overall length of 306 ft., a moulded beam of 42 ft., and a depth of 16 ft., the gross tonnage is about 2,150 tons. Each vessel is certified to carry over 1,400 passengers, 800 being first-class.

The passenger accommodation represents a considerable advance on the earlier vessels for this service. Everything possible has been done to ensure the comfort of the passengers, both in the public rooms and the state rooms. The accommodation for first-class passengers includes a general lounge, ladies' lounge, gentlemen's lounge, dining saloon, smoke room, and entrance lounge, two two-berth *cabines-de-luxe* and 19 two-berth private cabins on the promenade deck (which, if required, can be used as three-berth cabins), 16 one-berth private cabins on the main deck, and 20 two-berth private cabins on the lower deck. All the cabins are supplied with hot and cold running water. Two sets of two-pinion Parsons-type single-reduction geared turbines, taking steam from Scotch boilers, constitute the propelling machinery.

A WHALING FACTORY.

During the summer the Furness Shipbuilding Company, Haverton Hill-on-Tees, handed over the 20,000-ton twin-screw whaling factory motorship Sir James Clark Ross. This interesting vessel has been specially designed for the whaling service of the Rosshavet Company, of Sandefjord, Norway, and was constructed under Lloyd's Register special survey for their highest class for carrying petroleum in bulk. Built on the Isherwood bracketless system she has a length of 550 ft., a breadth of 74 ft. 3½ in., and a depth of 48 ft. 9 in. The deadweight capacity is about 20,000 tons. The equipment is most modern, and accommodation is provided for 100 factory hands in the forecastle, while the crew, together with the catchers' crew, are berthed in the poop. The propelling machinery consists of two sets of four-stroke cycle airless-injection engines, supplied by Burmeister & Wain, Copenhagen. This is the first occasion on which Diesel engines have been employed for a large whaling factory, and it will be interesting to see whether the experiment is repeated. The service is one that demands great engine flexibility, and hitherto steam reciprocating engines have been universally adopted for it.

M. I. MAR. E.

CHAPTER XXII.

WIRELESS POSITION FINDING.

THE whole art of the navigator is to know where he is, and where, if certain things happen, he will be next. If he can, with sufficient frequency, that is to say sufficiently easily, determine where he is, it is not difficult to make accurate forecasts of where he will be next. The prime element of his art is, then, position-finding. The more difficult this operation of position-finding, the more he is compelled to lengthen the period for which he forecasts and the less successful are his forecasts likely, on the average, to be. The older methods of position-finding depend essentially on visibility, and even on the insufficiently frequent occasions when visibility is good the number of terrestrial reference points which can be seen and utilised is usually small or zero, and observations on celestial reference points involve a degree of accuracy in measurement to which a moving platform is singularly unfavourable. They involve, too, computations which (however convenient and ingenious are the short-cuts provided by tabular and graphic solutions) must be of such accuracy that they are necessarily laborious and exacting.

The art of wireless communication came to the aid of the mariner, in the first instance, as a virtual extension of his range of hearing, and, with severe limitations which we will at once examine, of his range of vision. These limitations arise from the facts that the eye observation of an object can at once be interpreted, with some accuracy and without instrumental aid of any sort, in terms of the distance between the observer and the thing seen, and that instrumental methods of great accuracy are available for the measurement of the angular co-ordinates of the thing seen, relative to the position of the observer. The wireless "image" on the other hand, has an intensity, or signal strength, which could not at first, and can only in very special cases now, be at all accurately interpreted in terms of distance, nor has it even yet been possible to find instrumental means for determining all the angular co-ordinates of the wireless source relative to the receiver. The established practical trigonometry of wireless observation is restricted to the use of means which purport to measure azimuth, i.e. the angle between the vertical plane containing the transmitting and receiving stations and a vertical plane of reference, ultimately the plane of the meridian, but intermediately a plane fixed relative to the aerials of the transmitting or the receiving stations. The purpose of the present article is to examine the means by which this restricted measurement is made, and the errors which it may contain.

The essence of the matter lies in this, that a vertical wire supplied with the right kind of electric current acts as a transmitting aerial and sends out wireless waves which are equally strong at the same level and at the same distance in any azimuth relative to the aerial. In these waves the electric force is vertical; that is to say, they will produce in another wire placed anywhere in their undistorted field a current whose strength is greatest when the "receiving" wire is vertical, zero when the wire is horizontal, or proportional to the cosines of its two angles from vertical for intermediate inclinations. If two vertical wires are used as transmitting aerials, and suitably fed, then the waves will no longer be equally strong, at the same level and distance, in different azimuths. The strength of the waves, the field strength, for any particular azimuth will depend on the relation between the distance apart of the two wires and the wavelength used, and on the relative "phase" of the currents in the two wires, i.e. on the relative times at which the rapidly alternating currents in the two wires reach their instantaneous maximum and minimum values. If we adopt the simplest expedient for feeding the wires, by making them the vertical sides of a "frame" or "loop" aerial, joining their top ends together by one horizontal wire, their lower ends by another, and feeding a current into the closed circuit thus formed, then the vertical electric force at any azimuth will be a maximum in the vertical plane of the loop, will be zero in the vertical plane at right angles to the plane of the loop, and, generally, will be proportional to the cosine of the angle between the plane of the loop and the vertical plane containing its centre and the point of observation. This simple cosine law will hold if the vertical sides of the loop are separated by a distance which is small relative to the wavelength; for example, if the beacon wavelength of 1,000 metres is used, the loop must not be more than about 100 metres wide.

In the course of this elementary argument we have designed a rotating beacon transmitter. For if the loop we have just constructed be rotated at a uniform rate about a vertical axis, it will produce in an ordinary non-directional receiving installation within its undisturbed field a signal strength which varies between a maximum when the loop is pointing to the receiver and zero when its plane is at right angles to the vertical plane containing the axis of rotation and the receiving station. If it be arranged that the loop sends a characteristic signal when its plane is passing through the meridian plane, the receiving operator can, with a stop-watch, determine the angle between the meridian plane of the transmitter and the vertical plane containing the transmitter and the receiver, i.e. his azimuth relative to the transmitter. For he has only to determine the time interval between the "North" signal and the moment of zero signal strength at his receiver, as a fraction of the constant time between successive "North" signals, to have his azimuth in degrees expressed as a fraction of the 360 degrees of a full revolution.

It is perhaps unfortunate that the development of our argument has led us straight to the most recent commercial directional installations, omitting a quarter of a century's work on other aspects; it will be well to revert later to the rotating beacon and to look meanwhile at the converse arrangement which we can develop from our argument. Suppose we set up our loop as a receiving aerial and not as a transmitting aerial. Then the vertical electric force in the wave-field set up by any transmitting aerial will produce in it signals which are a maximum when the plane of the receiving loop points to the transmitter, which are zero when that plane is at right angles to the vertical plane containing transmitter and receiver, and follow a cosine law for intermediate azimuths, as indicated in Fig. 1. This gives the classical " direction-finding " apparatus in which, listening to a substantially fixed transmitting station, the receiving operator rotates his loop until he locates the sharply marked zero signal positions A A′ of Fig. 1, and reads on a scale the angle between the vertical plane of his loop and a reference vertical plane, which, on mobile craft, will be that of the fore-and-aft axis of the craft.

It appears then that in the complete azimuth-finding system of transmitter and receiver the essential directional characteristic may be vested in either the transmitter or the receiver. The arrangements at either end may be much less simple than those chosen as examples, but this need not at the moment be considered; the problems for immediate consideration concern the factors favouring the directional transmitter or the directional receiver in any special case, and those governing the decision as to whether, in the case of position-finding on mobile craft by reference to fixed stations, the directional apparatus, transmitter or receiver, should be at the fixed station or on the mobile craft. Considering first the second problem, the field of discussion may be limited by remarking that in the present state of the art a directional transmitter is more complex and more expensive than a directional receiver capable of being used in a system of equal overall accuracy. It is therefore very unlikely that a directional transmitter would be installed on shipboard; the choice then lies between directional transmitters or receivers on land *versus* directional receivers on board.

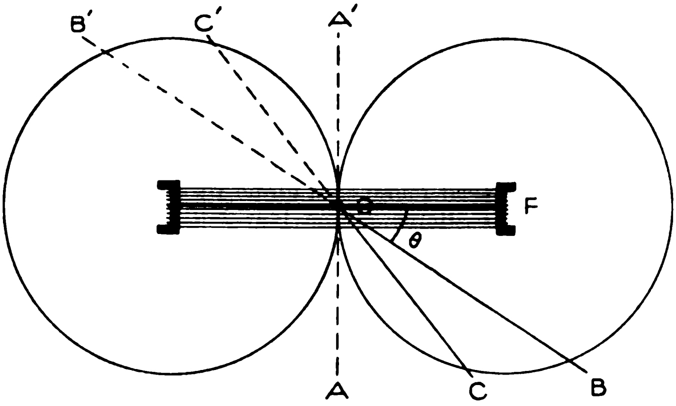


FIG. 1.

The land site offers all the advantages of a fixed platform over a moving platform as a site for operations of precision. It is substantially constant in its properties, it can be surveyed with precision. it can be modified and corrected, it can be checked, tested, calibrated, retested and recalibrated, and the full advantage of every previous improvement or measurement may be conserved in proceeding to the next. On the moving platform there is a considerable risk that any change will involve a start more or less *de novo* in testing and calibration. The " load factor " of a land system in general service is likely to be so good as to justify much greater refinement, and this, combined with relief from the acute problems of bulk and weight imposed by shipboard and above all by aircraft conditions, suggests that precision apparatus is more at home on land than afloat.

When we reach the question of errors in directional work we shall find that although the directional errors of a well-chosen land site are smaller than those of a shipboard site they are liable to be less uniform in distribution and more complex in character; the advantage, however, certainly rests, on balance, with the land site because of the favourable conditions for calibration.

A very important advantage of a land location for the directional element is the directness and accuracy with which bearings can be related to the ultimate reference plane, the meridian plane. In the mobile craft the radio-telegraphic measurements must be in nearly all cases made relative to the fore-and-aft axis of the craft, and a whole group of possible sources of error lies in the process of linking the determination so made, through the direction of the ship's head, to the meridian plane. Compass errors in general, errors due to short-period motions of the craft, errors due to incomplete simultaneity of reading of direction-finder and compass, will immediately suggest themselves in this category. The land station, on the other hand, is laid down once for all, with astronomical precision, to have its reference plane directly fixed on the meridian.

In short-handed craft, and the average aeroplane is almost by definition a short-handed craft, it is very undesirable that any responsibility which can be devolved from the personnel should be left on their shoulders; the land-station offers relief in this respect. In airships the restrictions as to bulk, weight, and personnel are somewhat less stringent than in heavier-than-air craft, but the problem of finding a suitable site for directional aerials on a rigid airship, without acute conflict between aerodynamical and electrical requirements, is almost insuperable. The electrical conditions demand that the aerials should be as far as possible from the very elongated conducting mass of the ship, which would tend to give a very high quadrantal error with all bearings closed in towards the fore-and-aft line; the aerodynamic conditions make the designer look with little favour on protuberances from the ideally smooth envelope of his ship.

Against the location on land of the directional element is the consideration that the probability of being within useful range of a normal wireless transmitting station is in general much higher than that of being sufficiently near an *ad hoc* land directional station, so that a shipboard directional receiver will be useful in places unprovided with the special installations. The shipboard receiver has the further advantage of being useful in inter-vessel work, and is therefore a specially valuable safeguard to safety of life at sea and by air, whether as a collision preventer, or in rescue work. It has also in its favour an extremely important psychological factor, that the navigator will tend to place reliance on the device which is, if not under his sole control, at the least under his immediate surveillance. This psychological factor operates much more strongly against the land directional receiver than against the land directional transmitter, because while direction-finding by reception is a specific non-repetitive operation which the navigator cannot re-check, reception from a beacon transmitter is a general repetitive operation in which every repetition is a check on every preceding use.

Turning to the choice between directional transmitter and directional receiver for the land installation, the transmitter has the advantage that it can work a definite programme known to all potential users, that its use involves the minimum number of operations for any one user, that one-way communication from land to craft is alone necessary (and that only a general and not a particular communication), that the use of the system by one client does not interfere with its use by any other. The directional receiver on land involves calling by the client, acknowledgment by the land station, the actual observation, and the communication of the bearing: during these operations the land station is monopolised by the one client to the exclusion and delay of others. Moreover, the directional transmitter requires only maintenance attention from its personnel, but the receiver demands constant watch, the performance of skilled observations, and the operation of a supplementary transmitter for the specific communications abovementioned. Almost the only countervailing advantage of the land directional receiving station is that it reduces to the minimum the tax on the attention of the client; this may give it a special field in application to aircraft.

These considerations, which are essentially peace-time considerations, go beyond the limits of wireless technique, and it is not for the wireless specialist to assign to them their relative weights; this is largely a matter for the user. Not for him, either, is the solution of the economic questions which must be weighed along with these technical ones; how far, for example, the first cost of a directional receiver in the craft will be offset by the freedom from dues for special services by land receivers; whether, again, it is more equitable and more economical in the long run to recover dues from individual users of the land receivers or to make provision of transmitters as a common charge; whether, again, the best of all possible ways is not to have directional transmitters on shore and directional receivers on board.

Of war-time conditions and warlike operations it would be a platitude to say that they involve exceptional difficulties; Scylla and Charybdis are negligible in relation to the risks of wireless navigation by any of the currently known methods. Whether it is better to provide a gratuitous beacon service for enemy craft or to let each craft signal so that the enemy may locate it is a dilemma likely to be resolved by wireless silence, although special methods are now available which offer a partial solution of these problems.

It will be noticed that in developing the direction-finder from first principles we have been content to determine the vertical plane containing transmitter and receiver, without determining how they lie relative to one another in that plane. There is, in fact, an ambiguity of two right-angles in our azimuth determination by such direction-finders. Auxiliary means, using current derived from a non-directional aerial, can be applied to resolve this ambiguity in cases where common sense and other available data are insufficient for its resolution. The sharpness of the unambiguous determination is, however, fundamentally inferior to that of the ambiguous one, and it is therefore good practice to make a precise measurement with ambiguity as the main operation, and to supplement it with a subsidiary operation in which the sense is determined.

OVERALL ACCURACY.

We have considered the nature of the measurement which can be made by directional wireless methods, the general principles on which it is based, and the main factors which govern the choice of the particular point in the communication chain at which the "precision" operation is to be performed. We must now attempt an estimate of the overall accuracy which may be reasonably expected from directional systems, and this estimate must be based on an examination of the possible sources of error. The possible defects of the complete chain may lie in any one of the constituent links, which are, (*a*) the site of the transmitter, (*b*) the transmitting apparatus, (*c*) the medium intervening between transmitter and receiver, (*d*) the receiving apparatus, (*e*) the site of the receiver, and (*f*) the personnel. These links may be considered separately, but consideration is simplified by a principle of reversibility which is of sufficiently general application to practical direction-finding. The principle enables us to treat the functions of transmission and reception as interchangeable, so that the errors of a site are the same whether the aerial system on it is used for transmission or reception, and the fundamental defects of the aerial system itself are the same whether it be used for transmission or reception.

Site error must be expected in every case in which the directional element cannot fairly be regarded as an isolated protuberance from an infinite and uniform conducting surface, i.e. in every case! It consists of course in a disagreement between the azimuth which would be inferred from the indications of an otherwise perfect directional system and the true azimuth. It takes perhaps its simplest form in a well-located system on shipboard, a case in which the wave-field has been successfully treated theoretically as distorted by a long semi-cylinder, representing the ship, projecting above the practically flat and well-conducting sea-surface. The net result is an error curve like that of Fig. 2, in which all bearings are closed in towards the long axis of the vessel, but with a simple sinusoidal distribution of errors which can readily be allowed for instrumentally or otherwise. The length of the ship is usually well below the wavelengths used for directional work, and the errors are usually practically independent of the wavelength used. The error may be diminished by raising the directional aerials well above deck level.

A well-chosen land site may be expected to be less affected by "quadrantal error" of this character, but unfortunately less regularly distributed errors due to large masses of conducting material, buildings, trees, overhead wires, nearby aerials, underground metalwork, and the like, come into prominence in these circumstances. Here, however, as on shipboard, the errors are permanent and therefore no more than inconvenient—because they can be allowed for—so long as no changes are made in the arrangement of the conducting masses. Circuits tuned near the wavelength in use are most dangerous neighbours for directional apparatus, otherwise direct calibration covers a multitude of sins against uniformity. Quadrantal error on shipboard may reach a maximum value between 10 deg. and 15 deg.; permanent site error at land stations may reach about half these values.

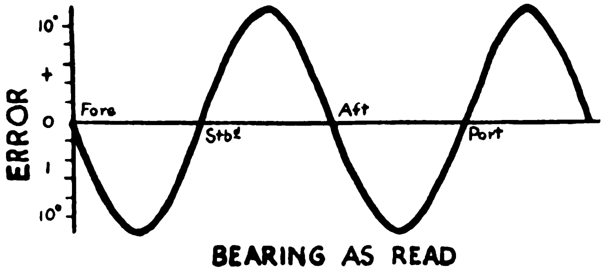


FIG. 2.

An interesting type of error which really belongs to the (c) class, but differs from the other members of the class in being of the nature of a " permanent " error, occurs when the path of transmission crosses a boundary between surfaces of different conductivity, for example, a coast-line. The waves in passing from the sea to the land are so deflected that they have a final direction less nearly parallel to the boundary than on arrival. The deflection is greatest when the waves graze the coast-line, and falls to zero when they meet the coast-line at right angles. This error, on the usual wavelengths, may reach about 5 deg., but can in most cases be included in the overall corrections derived from calibration tests. It is of interest to note, however, that the nature of the error as just specified is such that it makes a ship appear farther from the coast than it really is. It is therefore a singularly mischievous type of error, and should be given special attention. It has become customary, in the case of land direction-finding installations, to plot on the appropriate charts the " arcs of good bearings " within which experience has shown the determinations of bearings to be specially free from errors of this class.

Night Effect.

The most prominent errors produced by the medium between transmitter and receiver are those classed as "night effect," reaching magnitudes which at times render direction-finding completely useless over certain ranges. These effects have been very fully investigated in recent years, and it is necessary to give some account of their origin before proceeding to discuss their mitigation. It will be remembered that our argument on directional aerials proceeded from the existence of two separate vertical aerials to a system in which for convenience these vertical aerials were joined together by horizontal wires, the whole forming a frame aerial. The convenience was, as we shall now see, somewhat dearly bought. The phrases "vertical electric force" and "undistorted field" were used insistently in the discussion mainly because of troubles connected with these horizontal wires. As we saw, vertical electric forces produce no currents by their action on horizontal wires, and so in the undistorted field, with vertical electric forces only, the frame used as a receiver behaves admirably. But suppose horizontal electric forces are present? Then for these forces our arguments can be repeated with the word horizontal substituted for vertical, the horizontal wires are now active aerials connected by vertical wires and the frame aerial may no longer give zero signal when set at right angles to the transmitter. Worse still, the combination of horizontal and vertical forces in varying ratios may give zero signal for settings of the frame varying with the ratio, so that the frame will not merely fail to give a true bearing, but will give false bearings.

The general phenomena of night effect are due to horizontal electric forces, and take the form of variable signal strengths, disappearance of the positions of zero signal, appearance in their place of positions of ill-defined minima, which may wander over a wide range of settings of the frame, and occasional appearance of sharply defined zeros at erroneous settings. Why should these be night effects in particular? The explanation of these troubles, as of the "fading" troubles of broadcast telephony, of freaks in transmission on the "debit" side of wireless, and of the success of long-distance wireless on the credit side, lies in the existence of electrically conducting regions in the upper atmosphere, at heights of 60 miles and over. These regions act as more or less imperfect reflectors for wireless waves, and send back to earth some of the energy reaching them from the transmitter. The proportion of energy returned depends on the effectiveness of the reflection, and this in turn depends on the wavelength and on the electrical state of the upper atmosphere. Considering only the medium wavelengths we may say that the reflection is mainly effective during the hours of darkness, because during daylight hours these particular wavelengths are very strongly absorbed in the upper air. The process of reflection from these upper strata is in general accompanied by the production of horizontal electric forces in the reflected wave trains, even from a transmitter giving originally only vertical electric forces. (Note that a frame transmitter gives also horizontal electric forces.) These horizontal forces, acting on the horizontal sides of the receiving frame, give rise to the errors discussed above, errors which should strictly be called " abnormal polarisation " errors, but whose identification as " night " errors will now be understood. It may be added that for longer waves than those usually employed in navigation " night " conditions are often found to persist throughout the comparatively brief daylight hours of the winter season in middle and northerly latitudes.

Night error may assume values of any magnitude whatever ; it will be seen by consideration of the case of horizontal electric forces acting alone in a wave-train coming down from above that the error in this case is 90 deg. Examples have not infrequently been reported in which a transmitting station with a non-directional aerial has been misrepresented by the indications of a directional receiver as performing several complete revolutions around the fixed receiving station. It is therefore essential, first, to specify with some clarity the conditions in which night effect may be expected with standard apparatus, and, second, to devise apparatus which will be free from the dangers and limitations due to night error.

The conditions for production of this type of error are twofold : the horizontal electric forces must attain values which are not negligible relative to the vertical forces ; and the waves containing these horizontal forces must be travelling otherwise than horizontally. The first condition is sufficiently obvious ; small disturbing forces produce only small errors. The second is better demonstrated by the individual reader, to his own satisfaction, by a simple series of tests in which the edges of one book represent the sides of a receiving frame aerial, and the flat cover of another book represents the " wave front " of the arriving wave. It may seem unreasonable to insist on a tartan-clad volume for this latter purpose, but such a volume gives a further economy of thought, because the stripes parallel to one pair of edges will represent the lines of force which we have loosely been calling vertical—instead of talking of " vertical electric force," we ought to have used the more exact but more cumbrous phrase " electric force in the vertical plane of propagation " —while the other stripes represent lines of the force which we have been calling horizontal electric. It is to be remembered in these experiments that the receiving book must be held vertically to represent a frame aerial pivoted on a vertical axis ; further complication, due to reflection from the ground, comes in with non-vertical frames. If now the tartan cover, advancing from the direction of the transmitter or from the reflecting layer, hits one vertical edge of the " receiving " book before the other, a signal will be produced in the receiving loop by the vertical forces ; if it hits one horizontal edge before the other there will be a signal due to the horizontal forces. These two effects combine to produce the varying results above-mentioned.

For the wavelengths used in navigation the conditions just established will be satisfied approximately as follows. Up to 30 miles from the transmitter over land, and up to 100 miles over water (because the lessened absorption of the surface rays over water lets them travel so much farther before they fall to a strength comparable with the rays returned from aloft), the reflected rays will be so weak compared with the direct surface rays that they will not in any normal circumstances give night errors exceeding 2 deg. on the average of several observations. Over greater distances night errors at first increase, but then decrease because the wave from above, although still containing horizontal electric forces, is now, in its return after one reflection from the layer 60 miles up, nearly grazing the surface at the receiver; i.e. it is substantially horizontally propagated, and we have seen that horizontally propagated waves with any combination of "vertical" and "horizontal" electric forces do not give errors of bearing on a frame. Waves which have suffered several reflections may be arriving at considerable angles to the horizontal, but they will be so weakened at the successive reflections as to be negligible. A further cause of the reduction of error for these distances, the greater absorption of the energy from the horizontal field of force because of the currents which it produces in the ground, need not be discussed here. The principle of reversibility already mentioned suggests that the distances of practical immunity from night effect will hold alike for directional reception from a vertical aerial on a frame receiver and for reception on a vertical aerial from a frame transmitter, and experimental tests confirm this.

It is, however, but cold comfort to the benighted navigator 200 miles from a beacon to be told that were he half as far away he might neglect night error; it is far more helpful to offer him a system which is substantially free from its effects. The story of the development of such a system is interesting. It will be realised that conditions very similar to those described in connection with reflection from the upper atmosphere will prevail when signals are being received from an aeroplane with a trailing aerial at a considerable angular elevation relative to the receiver. During the war of 1914–18 a signal officer, F. Adcock, recognised the nature of this aeroplane effect, and devised a receiving aerial system in which he attempted to eliminate the effects of horizontal electric forces on horizontal parts of the aerial. A patent taken out in 1919 was allowed to lapse, and the invaluable Adcock principle lay dormant until it was taken up by Smith-Rose and Barfield in 1926, and developed into a practical system for reception. The development of the corresponding transmitting device, the Adcock rotating beacon, has suffered interruption owing to a fire, but has proceeded far enough to outline the beacon of the future.

In essence the Adcock aerial system is the pair of vertical wires on which our discussion of directional systems was based; it is a picturesque inversion of logic to say that it is a frame aerial with the horizontal sides left out. The difficulties of practical development have arisen from the astonishingly severe difficulties of eliminating the effect of horizontal electric forces on the horizontal conductors which are almost inevitably involved in comparing the currents in the two vertical wires. The practical form of the Adcock type of directional apparatus will be outlined in the brief review of typical directional apparatus which follows.

The particular form assumed by directional apparatus for any particular application will be determined very largely by the general distinction between " homing " devices, which are designed to make it as easy as possible for craft travelling along one fixed route to remain on that route, and the more generally applicable cross-bearing systems which may be used by craft which are not steering directly towards or away from the transmitting station. In general the homing devices, which are really wireless leader gear, will be much more useful in aircraft navigation than in marine working, and they are being vigorously exploited in the United States from this point of view. A further distinction may be drawn between " aural " and " visual " indicating apparatus, either form being applicable to homing or to position-fixing systems, as will be seen in the examples quoted below.

The distinction between fixed aerial frame and rotating frame systems is not a fundamental one. The Bellini-Tosi system with its two frames fixed at right angles is merely an ingenious modification in which the rotation of an unmanageably large loop is avoided by replacing it by two fixed loops of the desired size and coupling them through a crossed transformer with a small search coil, the rotation of which gives the same electrical result as the rotation of the imaginary large loop, of which the two fixed loops are components.

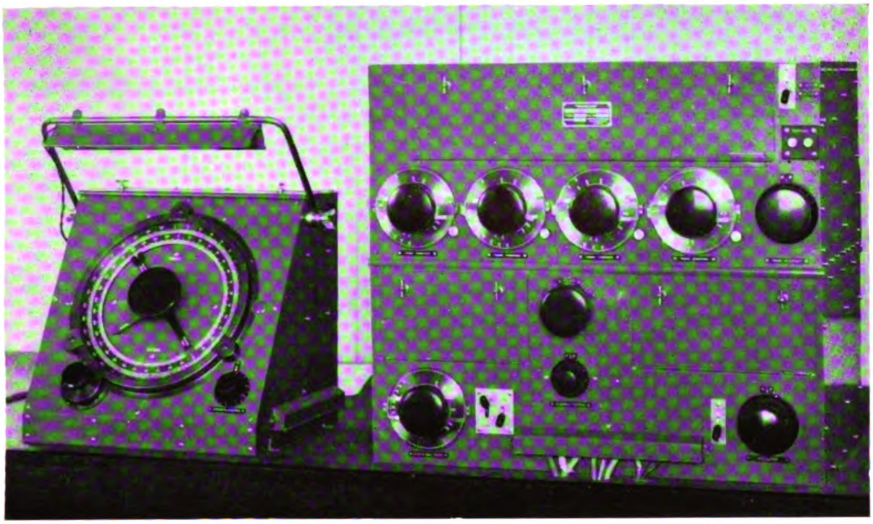
TYPICAL DIRECTIONAL RECEIVER FOR SHIPBOARD.

As representative of standard marine practice at the present time, the Marconi Naval Type Direction Finder, Type D.F.M.4, may be taken. The fixed loop aerials, 4 ft. 6 in. in diameter, are screened in stout metal tubes and mounted on a pedestal. The radiogoniometer (the crossed transformer with rotating search coil) is shown on the left and the receiver on the right of Fig. 3 (plate opposite). The whole equipment uses seven valves and has a range of reception from a 1½ kw. coast station which exceeds the normal desired (and safe) range of 100 miles. Sense finding is performed as a subsidiary operation for which a short vertical aerial is fitted as part of the installation.

AIRCRAFT DIRECTIONAL RECEIVERS.

A typical direction finder for use in aeroplanes is the Marconi A.D. 16. In the aeroplane of wood and fabric construction, the two fixed frame aerials may conveniently be doped to the leading edges of the wings and to the fuselage. In modern all-metal aeroplanes the difficulties of satisfying the opposing electrical and aerodynamical conditions already mentioned may be very severe. The total weight of the A.D. 16 installation, complete, is just under 90 lb.

For the restricted operation of homing, a simpler apparatus weighing about 70 lb. is available. This device has also fixed aerials, but by a combination of aural and visual methods the



[*By courtesy of Marconi's Wireless Telegraph Co.*

FIG. 3.—MARCONI DIRECTION FINDER, TYPE D.F.M. 4.

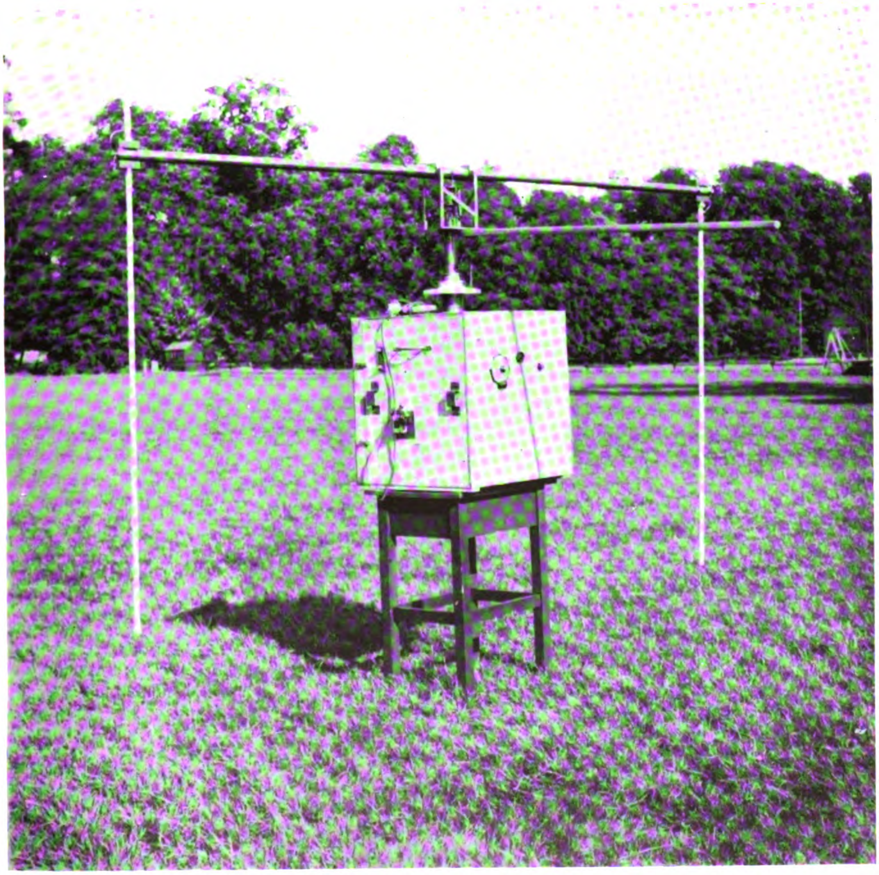


FIG. 4.—PORTABLE ADCOCK RECEIVER.

navigator obtains visual indication as to whether he should turn to starboard or to port, or whether he is heading directly towards (or away from) the transmitting station.

PORTABLE ADCOCK RECEIVER.

The Radio Research Station, Slough, has developed a portable Adcock receiver which has been tested and demonstrated on wavelengths from 12 to 60 metres, but can be adapted for other wavelengths. Its general design may be seen from Fig. 4 (facing page 258). The tuning and amplifying apparatus is contained within the metallic screening box, a 2 ft. cube, which carries on its upper face the bearing for the vertical axis about which rotates the "Adcock pair" whose spacing is about 10 ft., while each vertical Hertzian dipole is about 10 ft. long.

ADCOCK GROUND RECEIVING STATION.

Both the Radio Research Station, and, more recently, the Marconi Company, have shown complete ground receiving stations operating on different approximations to the Adcock ideal. In the Slough installation the height of the central supporting mast is 100 ft., the spacing between the opposite aerials of an Adcock pair being 50 ft. The Marconi installation has an aerial height of 70 ft. and a spacing of 300 ft. Both have, on the wavelengths on which they have been tried, shown spectacular reduction in night error, as shown directly by simultaneous observations on Bellini-Tosi and frame direction-finders.

NON-DIRECTIONAL BEACONS FOR POSITION-FINDING.

For the assistance of craft fitted with directional receivers there have been installed round the coasts of the British Isles a group of "wireless lighthouses," non-directional beacon transmitters sending out characteristic signals by which they can be identified individually, and working to a fixed time programme arranged to minimise the mutual interference which would arise from random transmission within a limited waveband. Approximately 15 of these beacons, each of about 50 to 100 metre-amperes rating, are now in operation round British coasts, as, for example, at Dungeness, Cromer, Skerries, etc.; five more are under construction, and the total number in operation on the world's coasts is about 200. The full programme of beacon transmissions is to be found in the "Admiralty List of Wireless Signals," and in "Admiralty Notices to Mariners."

THE ORFORDNESS BEACON.

The only rotating beacons of the general type discussed in the earlier pages of this article which are in commercial operation are those installed by the Air Ministry and the Board of Trade at

Orfordness, Suffolk, and the Air Ministry beacon at Cove, Hants. The general arrangement is illustrated in Fig. 5 (opposite page). It will be seen that a tall wooden structure provides a weather-tight housing for a frame aerial 10 ft. square, driven by an electric motor, and carrying within itself the whole oscillatory circuit of the wireless transmitting apparatus of which it forms the aerial.

The beacon has a plane of minimum intensity which rotates at a uniform speed of 360 deg. per minute, based on the true meridian as starting point. An identification signal for the beacon is emitted at the beginning of each period of operation and characteristic signals are sent each time the minimum plane passes through true North and true East. The navigator has thus only to take by a chronograph or stop watch the time between one of these characteristic signals and the time at which the signal momentarily vanishes in his non-directional receiver, and convert it into degrees from the true North or true East at the " rate of exchange " of 6 deg. per second. Instructions in considerable detail are to be found in " Notices to Mariners " (No. 1155).

THE ADCOCK BEACON.

The simple frame rotating beacon just described is limited in its useful range not by its limited power, but by the occurrence of the errors discussed above as night effect, due to the radiation from its horizontal members. Experiments have recently shown that the Adcock principle can be applied with success to the transmitter as it had previously been applied to the receiving apparatus. There appears to be no room for doubt that a commercially satisfactory beacon can be designed on this system to give reliable bearings over distances up to about 500 miles, substantially free from night error. The experimental transmitter erected under the auspices of the Radio Research Board at the National Physical Laboratory was unfortunately destroyed by fire a few months ago, but it is to be hoped that extended trials of a sufficiently powerful beacon of this type, erected on a suitable site, may be found possible at an early date.

VISUAL DIRECTION FINDERS.

The first visual direction-finder in radiotelegraphy was the loop of wire with a tiny spark gap with which Heinrich Hertz laid the foundations of radio communication. More precise, but subject to very severe limitations, was the device of Alessandro Artom, which was intended to indicate on a galvanometer scale, but had too many ambiguities and too little sensitivity to be commercially valuable. The Radio Communication Company demonstrated in 1926 an entertaining installation which turned its own frame aerial until it pointed towards the direction of the incoming signal. The apparatus was, however, delicate and complex, and did not appear to lend itself to conversion to " fool-proof " form.

A robust type of visual direction-finder, first suggested in 1916, demonstrated in 1923, and still in course of improvement from the

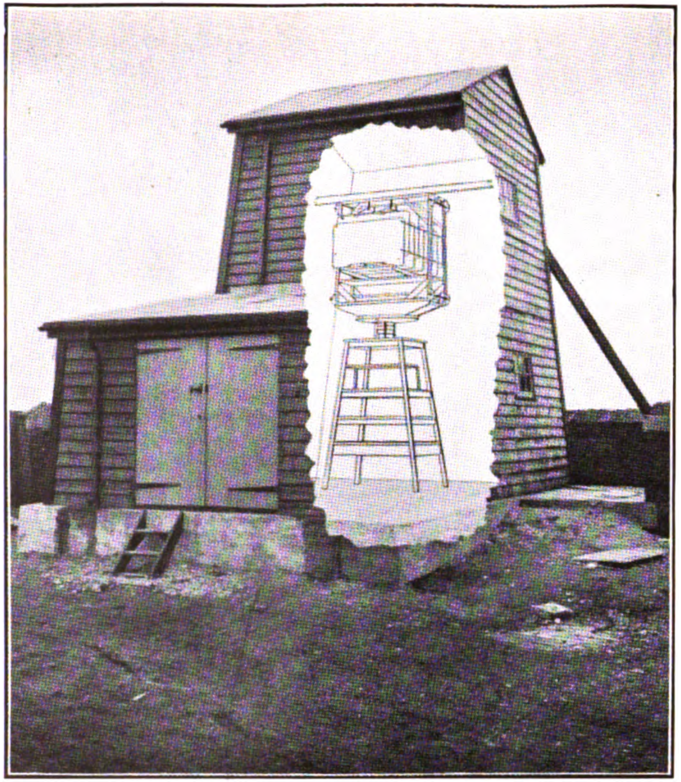


Fig. 5.—Fort Monckton Rotating Beacon.
(View inside hut.)

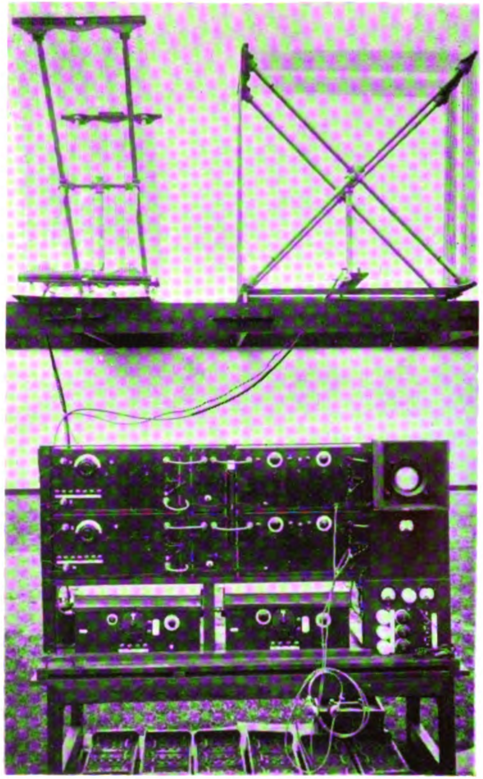


Fig. 6.—Visual Direction Finder.

point of view of simplicity in operation, depends on the use of a jet of electrons as the pointer of the indicating instrument. Its present form, as a laboratory instrument in use at the Radio Research Station, Slough, is shown in Fig. 6 (facing page 260). The frame aerials, 3 ft. square, are in fixed positions at right angles to each other. Each feeds into a completely independent tuning and amplifying system, provided with easy means for intercomparison and adjustment to equality. The amplified signals from the two frames are applied to produce deflections, in two directions at right angles, of the electron jet in a cathode ray oscillograph. The jet, striking a fluorescent screen inside the end of the oscillograph tube, produces a luminous spot in the absence of signals, and the arrival of a signal draws the spot out into a luminous line which reads directly, on a compass " card " inscribed on the tube, the direction of arrival of the signal. The accuracy of reading is of the same order as in aural instruments, the sensitivity is such as to enable it to be used on the weakest commercial signals, and its instantaneous response gives it some very remarkable properties not shared by any other direction-finder.

The International Marine Radio Company have recently described an interesting form of visual direction-finder. The frame aerial, about 2 ft. high, is rotated very rapidly (600 r.p.m.), and continuously by an electric motor, and with it is rotated at the same speed the field magnet of a galvanometer. The moving coil of the galvanometer is freely pivoted and without restoring forces, and through it is passed the amplified and rectified signal current from the frame aerial and from a vertical aerial associated with it to eliminate the ambiguity of sense. The inertia of the coil is sufficient to give an integrating effect over the time of a revolution of the frame. In these circumstances the galvanometer coil will set itself so that its pointer reads directly the bearing of the transmitter. The instrument takes a few seconds to reach its equilibrium reading, and an accuracy of the order of one degree, with a high sensitivity in respect of signal strength, is claimed for it. It would appear to be liable to night error and to the effects of jamming in much the same degree as is the ordinary aural direction-finder.

The " Radio Range."

Under the alliterative family name of " Radio Range " the U.S. Bureau of Standards has developed a group of devices, of increasing complexity at the transmitter, permitting simple aural or visual determinations in aircraft to guide the pilot directly towards or away from an airport. These radio ranges represent the highest development yet reached in homing devices. The general principle of all is the production of equi-signal zones each of which is in effect a wireless leader gear terminating at the transmitting airport.

Consider two transmitting frame aerials set vertically and with their planes at right angles. Let both be equally excited by the same radio frequency, but let the signal N (— ·) be sent from one, and the signal A (· —) from the other, the signals being mechanically timed so that the dot of the A falls into the dot-duration space of the N, and that of the N into the space of the A. Then it will be clear from our earlier discussions that a listener on an aircraft whose position is in the plane of the N frame will hear a series of strong N's only, and in the A frame plane he will hear A's alone; if he is in any other position he will hear interlocking N's and A's of different relative strengths, but in the planes at 45 deg. to either frame the signal strengths will be equal, and the interlocked signals will now merge completely into a long dash. Slight departure from this plane will allow either N or A to predominate according to the side towards which the departure occurs. This simple system, then, defines four "equi-signal" courses, all at right angles to their neighbours, centring on the transmitter, and a pilot can fly down any zone, detecting any departure of so much as a mile from its axis by the loss of the equi-signal condition.

If visual instead of aural indications are desired, the Morse signals may be replaced by two musical frequencies and the aircraft receiver fitted with a device having vibrating reeds tuned to respond to these frequencies. Then the width of the band traced out by the tip of each reed will indicate the strength of the corresponding signal, and the equi-signal condition will be recognised by the equal widths of the two bands.

It is happily uncommon for airports to be rigorously arranged at the corners of chessboard squares, and for the full exploitation of the Radio Range method it is clearly desirable that means should be available for setting the equi-signal zones so that they connect one airport, however situated, directly to its neighbour on the route. It is not necessary to discuss here the details of the methods used, but it will be appreciated that adjustments of the relative strengths of current in the different frames, the setting of two or more frames at angles other than right angles, and the addition of non-directional radiation from a vertical aerial in the centre of the frame system, afford sufficient flexibility to permit of the setting of courses at arbitrary angles, one to the other, and of the discrimination of one course from the other by characteristic signal groupings.

On these lines has been developed the twelve-course Radio Range, giving the aircraft fitted with the appropriate receiver, containing three tuned reeds, the choice of twelve defined routes converging on or radiating from the airport. A map showing characteristic colours for the different courses, a colour code on the indicator, and a set of simple rules for identification by colour, complete the provision for selecting or recognising the required course, while a further set of rules, which should be seldom required, enables the navigator, should he have got into the state of being completely "lost," to pick up his position by sampling adjacent equi-signal zones. A simple additional fitting in the receiver enables a pilot to fly, not directly along a selected course, but along a course at a selected small angle to it.

This organisation, ingenious and labour-saving as it is, suffers, as must be expected from our discussion of night effect, from errors which may show themselves at distances of 25 miles or more from the transmitter. The means for the mitigation of these errors, while retaining the general principle of the Radio Range, are not obvious. It may be doubted, indeed, whether they are attainable. The mere substitution of Adcock aerials will not afford substantial relief, because the special merit of the Adcock transmitting aerial lies in its unique property of zero radiation, in respect of both vertical and horizontal electric forces, in a selected vertical plane. Systems which involve the interpretation of signal strengths in planes other than this zero plane lose the advantage of its unique neutrality.

Present State of Direction-finding.

We may very briefly summarise the present state of commercially operative position-finding apparatus by saying that the commercial installations, whether for reception or transmission, in general use at the moment are capable of being read to instrumental accuracies of a fraction of a degree, but that the real practical accuracy of observation for all of them when the sources of error above described are taken into account is in the neighbourhood of 2 deg. for single observations at any range in daytime, and up to 100 miles over sea at night, and that an accuracy of the same order may be obtained at several times this distance over sea at night-time, if a sufficient number of observations is averaged.

Whether this accuracy is sufficient for navigational purposes is a question for the navigator; the radiotelegraphist, possibly on inadequate information, inclines to the view that it compares not unfavourably with the average accuracy practically attained with other methods of position finding.

The existing installations are sufficient to allow early conclusions to be reached as to the relative spheres of usefulness of the different systems depending on (*a*) shipboard directional reception from non-directional transmitters, whether *ad hoc* beacons or traffic handling stations; (*b*) land station directional reception of transmissions from the craft requiring a determination of its position; (*c*) shipboard reception from rotating directional transmitters, and (*d*) shipboard reception from fixed "equi-signal zone" leader gear. It need hardly be said that the word "shipboard" is used here, as elsewhere, in this discussion, in a wide sense.

The existing installations are probably also sufficient for the experimental exploration of the increasingly pressing problem of congestion of wireless channels of communication. It is by no means clear *a priori* whether the permanent monopolisation of a fairly wide wave-band by a network of beacons is more or less tolerable than its intermittent occupation by transmitters asking for positions. It may be that some of the visual methods described may, apart from their intrinsic merits in other respects, be brought into prominence by their contribution to the mitigation of the interference problem. It should be noted that the problem of interference is a doubly serious one in aural direction-finding; an interfering signal insufficiently strong to prevent the reading of a desired message may still be strong enough to reduce very greatly the accuracy with which the direction of arrival of the desired signal may be read, and the operation of aural direction-finding, whether by transmission or reception, depends on determining the occurrence of a minimum intensity of the desired signal, which is thus in its very utilisation reduced to inability to compete with interfering signals of quite moderate strength.

THE IMMEDIATE FUTURE.

The writer holds very strongly to the opinion—an opinion which is, like all the opinions here expressed, to be read as a purely personal one—that the immediate future of direction-finding lies with the Adcock system in its various applications. Every type of installation described in this article is capable of modification to employ Adcock aerials, and great gains in the ranges and periods over which freedom from night effect may be assumed must at once result. The identity in principle of " night error " and " aeroplane effect " reinforces the argument for the adoption of Adcock devices in all aircraft work, although it has already been indicated that the " Radio Range " will not be freed from night error by the adoption of Adcock aerials.

It may be asked why the rotating frame transmitter, in conjunction with a vertical aerial at the receiver, should not be immune from night effect. Superficially, it might appear that the immunity of the vertical aerial from the action of horizontal electric forces would give the desired immunity. But just as passage through the ionised upper layers may produce horizontal forces from initially vertical forces, so the initially horizontal components of force from the frame transmitter may return from aloft after conversion into vertical forces which will interfere with the normal reception on the vertical aerial and give false minima. The essential and immensely important advantage of the Adcock transmitter is that while the frame aerial is shooting horizontal electric forces towards that part of the upper layer which lies in a given azimuth A, at the moment when it is sending no vertically polarised waves towards azimuth A, the Adcock transmitter is sending no radiation whatever in the direction A.

In these circumstances we are faced only with the ultimate limitation of all position-finding by wireless, the possibility that the receiver may be affected by waves which have been laterally deviated, at ground level or aloft, so that they no longer reach the receiver in the vertical plane which contains both transmitter and receiver.

One of the immediate future tasks of directional wireless research must be the investigation of the possible extent of this lateral deviation. Suggestions have appeared, in various experimental tests, that such deviation does occur, though of small amount on medium wavelengths, but until the development of the Adcock receiver such effects were bound to be overlaid by other and larger effects which prevented their systematic investigation. Along this line lies, I think, the possibility of narrowing the tolerance of ± 2 deg. at present accepted as limiting the accuracy of direction-finding on medium waves.

Of the immediate future of the visual direction-finders I speak with less certainty. They are subject to the disadvantages cited against the directional receiver in its competition with the directional transmitter, but at least one of the visual instruments has the countervailing advantage of extreme speed in operation with the accompanying advantage of absolute continuity of watch where required. The same instrument has the additional unique advantages of almost complete immunity from interference, since it is capable of simultaneous direction-finding on several transmissions of the same wavelength, and of accurate measurement on excessively brief transmissions, a property important in relation to the " congestion of the ether," and to warlike operations.

The " Radio Range," perhaps a little improved by the adoption of the Adcock transmitting aerial, will within the ranges at which night error becomes important be an almost ideal device for the central airport, since it reduces to a minimum the tax on the attention of the aerial navigator entering or leaving the port. But this convenience to the user is bought at the expense of his radio-telegraphic neighbours—it is not always a blessing that radio annihilates distance—and this price may be too high for the community at large to tolerate.

The problems of congestion of channels of communication have been eased, in the carrying of ordinary radio-telegraphic traffic, by the transfer of traffic to the shorter wavelengths, which provide many more channels. Such a solution is denied to the position-finder, because the relative magnitude of disturbing phenomena due to energy returned from the upper layers increases rapidly as the wavelength is diminished. These phenomena take the form of exaggerated " night effect " and of " scattering " ; in the latter the results of lateral deviation may completely obscure the direction indications. These effects of energy returned from aloft persist until the wavelength is reduced to limits, below those of current commercial practice, where signalling is almost confined to the range of optical visibility. On these ultra-short waves, although fog penetration is a valuable asset, new disturbances to position-finding in the form of secondary radiation and reflections from terrestrial objects, and excessive site errors, may come into prominence.

In conclusion it may be repeated that the only radio-telegraphic azimuth-finding operation which at the present date can be regarded as offering a consistent approximation to perfection is that involving either an Adcock transmitting beacon or an Adcock receiving aerial system. Both variants have their special defects in convenience of application to various requirements, but both stand apart from all other radio-telegraphic position-finding devices in their freedom from errors which overlay the apparently small ultimate errors due to lateral deviation which may, pending their complete investigation, be regarded as unlikely to reach magnitudes exceeding 2 deg. in any normal circumstances when medium wavelengths, such as those now used in position-finding, are employed.

R. A. Watson Watt.

CHAPTER XXIII.

COMMERCIAL MARINE AIRCRAFT.

ALTHOUGH it has been fairly obvious to any one at all familiar with flying that no nation in the world has more to gain from the use of aircraft operating from the sea than has the British Empire, not until the last few years has Great Britain really seriously attacked the problems of marine aircraft. As the reasons for this are not, perhaps, quite obvious to those who have not made a special study of aircraft, it may be of interest here to state very briefly the main considerations which delayed the programme of development.

For a true appreciation of the position it is necessary to go back to the years immediately following the War. The best types of marine aircraft, and more particularly flying-boats, were inferior in aerodynamic efficiency to the best types of landplane. Structurally they were of greater weight for a given disposable load, and the view was fairly generally held that this was a drawback inherent to the type. It was only very gradually that this view was changed. The firms which had pinned their faith to the flying-boat had a great deal of prejudice to overcome, and this naturally took considerable time to achieve. Largely as a result of the proofs provided by designing and building flying-boats for racing purposes, it became clear that, aerodynamically, the flying-boat could be made much more efficient than it had hitherto been. A more thorough knowledge of the effects of the hull shape, the size, shape and disposition of the planing steps, and a more efficient disposition of the power plant led to vast improvements. The structural problems were, in a way, more difficult. Whereas the loads to which a landplane was likely to be subjected during take-off and landing were fairly well known and subject to reasonably accurate calculation, the same did not apply to the hull of a flying-boat. The problems met with in a seaway were different, and concentrated loads and stresses might be encountered in rather unexpected places. However, gradually research and experiment provided data for the designer to work upon, and the ratio of gross weight to tare weight of flying-boats continued to improve. A time was reached when the well-designed flying-boat was not appreciably inferior in any way to the well-designed landplane of the same weight except in one respect. Take what precautions they might, the builders of flying-boats were unable totally to avoid water soaking into the wooden planking of the hull. In a large flying-boat the weight of the water soaked up by the hull might amount to several hundred pounds.

This did not necessarily mean any appreciable weakening of the structure, but it did mean a loss in performance and a decrease in disposable load.

It was the introduction and perfecting of all-metal construction which enabled the flying-boat to come into its own. Problems had to be overcome, it is true, but the reward, in the form of absence of water soakage, made the effort worth while. The early metal hulls, built of duralumin, were naturally of somewhat more complicated construction than they need have been. This not only meant excessive cost of production but also resulted, in many cases, in numerous parts of the hulls being inaccessible, with the consequence that water collecting in odd corners was left there, and corrosion set in. As experience was gained, it was found possible to simplify the construction and to avoid awkward corners from which the water could not be removed. The anodic process of treating duralumin afforded a good protection against corrosion provided the surface was not scratched, and provided small quantities of water were not allowed to stagnate in odd corners. Thus, gradually and step by step, the modern flying-boat hull was evolved, and so far has the art of hull design and construction advanced that a metal hull can now be built lighter than the wooden hull of the same displacement, and with the added advantage of absence of water soakage.

We are now on the eve of another very important stage in the evolution of the large flying-boat, again as a result of the metallurgist's art. It is possible to protect duralumin, or any aluminium alloy for that matter, against corrosion, but special precautions have to be taken, not only during manufacture of the hull but also while the flying-boat is in actual use. The beaching of a flying-boat, if no special beaching trolley is available, may, and almost certainly will, scratch through the anodic treatment surface and expose the metal underneath. Unless care is taken to wash the scratched part with fresh water and paint or varnish it as soon as possible, corrosion may set in. Thus the aluminium alloy does not offer the complete solution of the problem. The metallurgist has now stepped forward with his rustless steels, and the steel manufacturer has followed by turning what was originally merely a laboratory process into a practical manufacturing possibility. The rustless steel is still expensive, but the large demand for it for other purposes will help to bring down the cost of the forms used in flying-boat construction.

The one remaining obstacle to the general adoption of rustless steel for flying-boat construction is connected with the density of the material and the size of the boat hull. Steel, being much heavier per unit of volume than aluminium alloy, has to be used in much thinner gauges to keep down the weight. In a small flying-boat the thickness of the steel sheet has to be so small that its use becomes impracticable. Fortunately the art of flying-boat design is now so far advanced that it is possible to plan with considerable confidence even quite large boats, and thus the use of the rustless steels now available becomes practicable. Rustless steel has already been used for several British flying-boats in certain exposed places, notably for the planking of the planing bottom, and has given good results. The large flying-boats now being designed and constructed will have hulls planked entirely with this material. Then the one remaining drawback—that of corrosion—should be entirely removed, and the future of the flying-boat looks very bright indeed.

BLACKBURN "NILE."

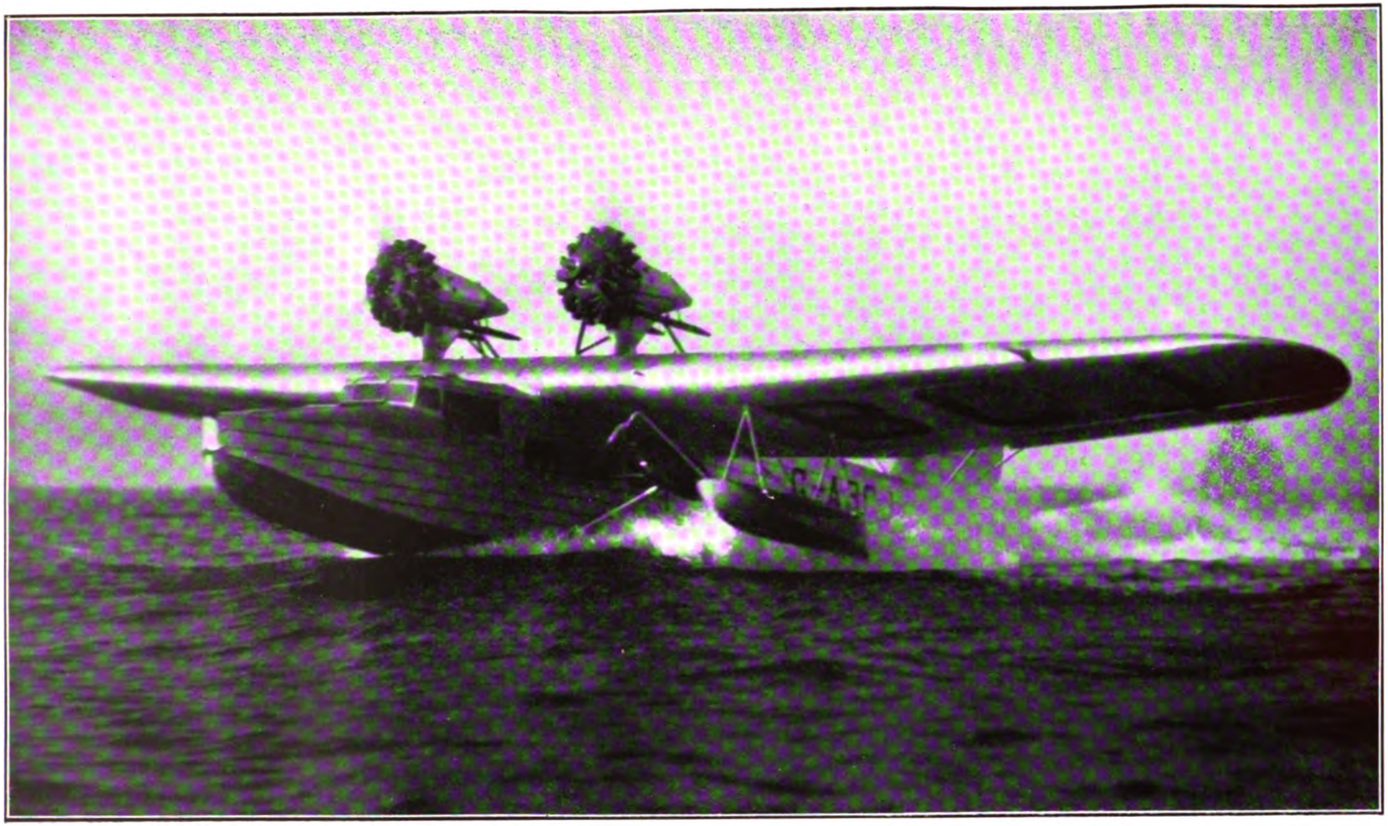
Reference was made in last year's issue of this "Annual" to the large monoplane flying-boat designed by the Blackburn Aeroplane and Motor Company, and to be known as the "Nile." The hull of this boat was exhibited at Olympia in 1929, but the builders have been so busy on the production of flying-boats for service purposes, notably the "Iris IV" and the "Sydney," that work on the "Nile" has had to be suspended for long periods. Consequently the machine was not, as had originally been expected, completed during 1930. Its gross weight is estimated at 23,500 lb., and it has accommodation for 14 passengers and a crew of three. The hull is constructed almost exclusively of duralumin, but rustless steel is used for all fittings, etc.

SAUNDERS-ROE BOATS.

The little "Cutty Sark" flying-boat, first produced by Messrs. Saunders-Roe in 1929, has now been built in several specimens and has proved a very successful small craft, her size being such as to appeal to the private owner rather than to the operator of a regular air route. In spite of her small size, the "Cutty Sark" has, however, been used for a service between Southampton and the Channel Islands, and made the trip successfully many times during 1930.

When this firm first produced the "Cutty Sark," the machine was intended as the smallest member of a whole "family" of flying-boats. Next in size was to come the "Windhover," a 4–5-seater flying-boat with three de Havilland "Gipsy" engines, and this was to be followed by a larger machine, the "Flying Cloud," with seating accommodation for 6–8 passengers. Actually the last was completed, during 1930, before the "Windhover," and did a considerable amount of flying.

Generally speaking both the "Flying Cloud" and the "Windhover" have a strong resemblance to the "Cutty Sark," but are of larger dimensions and greater weight. The former has a wing span of 64 ft., a wing area of 650 sq. ft., and a gross weight of 8,100 lb. The machine is an amphibian with a wheel undercarriage attached to the duralumin hull, so that it can be operated from either land or sea. If it is used as a pure flying-boat, the weight saved by omitting the wheel undercarriage can, of course, be used for carrying pay load. Fitted with two Wright "Whirlwind" engines the machine has a maximum speed of 120 miles an hour. In the



"SARO CLOUD" FLYING BOAT.

(*Builders, Messrs. Saunders-Roe, Cowes.*)

amphibian version the tare weight is 5,500 lb., giving a disposable load of 2,600 lb., which can be divided into any desired proportion of fuel and pay load, the latter increasing as the range decreases.

The "Windhover," with seating accommodation for pilot and 3 or 4 passengers, is powered by three "Gipsy" engines totalling 315 h.p., and its gross weight is 5,400 lb., with a tare weight of 3,570 lb., leaving a disposable load of 1,830 lb. If the land undercarriage is fitted the tare weight is increased to 3,840 lb. and the disposable load decreased to 1,560 lb. The wing span is 54 ft. 4 in., and the wing area 450 sq. ft., while the maximum speed is about 100 miles an hour and the cruising speed 80 miles.

SHORT "VALETTA."

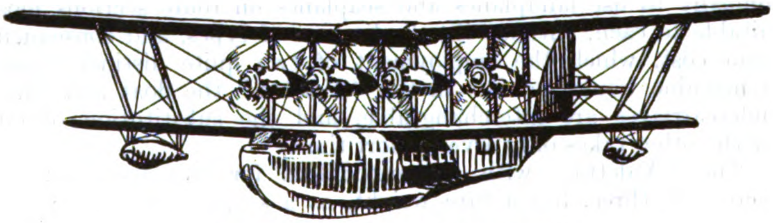
Two main objects were aimed at by the designers of Messrs. Short Brothers in producing the "Valetta" three-engined monoplane—to provide a comparison between the flying-boat type and the twin-float seaplane type of marine aircraft, and to introduce a machine capable of being used at will as a seaplane and as a landplane. The latter feature would be of very considerable advantage on a long Empire air route, since it would enable the operating company to use landplanes and seaplanes on route sections most suitable to each, without the duplication of types, and consequent extra cost, which the employment of two quite distinct classes of machine would entail. In the "Valetta" the float and wheel undercarriages are interchangeable, and the substitution of one for the other takes only a very short time.

The "Valetta," with accommodation for 16 passengers and a crew of three, has a tare weight, as a seaplane, of 14,535 lb., while the maximum permissible gross weight is 22,400 lb., giving a disposable load of 7,865 lb., and a ratio of gross weight to tare weight of 1·54. As a landplane the machine has a tare weight of 13,985 lb. and a gross weight of 21,850 lb., leaving a disposable load of 7,865, or exactly the same as for-the seaplane. The engines fitted are Bristol "Jupiter" XI F. developing 490 b.h.p. at 2,000 r.p.m. The performance of the machine in its two forms is approximately the same, with a top speed of about 135 miles an hour for the seaplane, and approximately 138 miles for the landplane. This performance is a good deal better than that of the "Calcutta," but it still remains to be proved whether the "Valetta" will be as seaworthy in rough water as the boat. In smooth water, operating from rivers and lakes, the "Valetta" should be very serviceable, and its convertibility into a landplane is an important point in its favour.

FOUR-ENGINED "CALCUTTA."

During the latter part of 1930 it was announced that Imperial Airways desired to try out a four-engined flying-boat on the Mediterranean section of the air routes to India and South Africa, and Messrs. Short Brothers were entrusted with the design and construction of the new machine. The new "Calcutta" will probably make its appearance during 1931. The older, three-engined "Calcuttas" have given good service on the Mediterranean section, but it was felt that a greater reserve of power would provide an extra safeguard against forced descents on the sea as a result of engine failures, and so it was decided to try the four-engined power plant.

In the design of any aircraft it is necessary to make the most useful compromise possible between a number of conflicting requirements. In the matter of hull design the older "Calcutta" left little to be desired, and the hull of the new machine will not differ materially in its general lines from the older form. But the four-engined power plant system left the designers with at least two alternatives—to place the engines in two tandem pairs, or to spread them out in line. The former arrangement is likely to be slightly more efficient aerodynamically, as it is probable that the drag of two engines placed in tandem will be considerably less than twice the drag of one engine. On the other hand, the cooling of the rear engine raises certain problems, while the fact that its propeller has to be of greater pitch than that of the front engine, in whose slipstream it works, means that if the front engine stops, the propeller of the rear engine is "overpitched," and loss of power results, so that the actual reserve of power available is less than the plain power figures would indicate.



SHORT FOUR-ENGINED "CALCUTTA."

By placing the four engines in line along the wings, the drag is likely to be greater, but the engines are very accessible, cooling difficulties are avoided, and last but not least the distribution of the engine weights along the wing span reduces the wing stresses and results in a certain amount of weight saving on the structure. It is the latter arrangement which the Short designers have chosen in the new four-engined "Calcutta."

The new machine shows the same general lines as the older "Calcutta," but it is of larger dimensions and greater weight, and its wing bracing system is slightly different, owing to the use of four instead of three engines. Structurally it will resemble the "Calcuttas" except for the introduction of stainless steel for the underwater portion of the hull, from the keel to slightly above the water line. This should mean that it will be perfectly feasible to leave the machine at moorings for very long periods, and in fact this is the logical way to keep a flying boat when it is not in use. The time will undoubtedly come when a flying boat is taken out of the water for a major overhaul only, and in the new four-engined "Calcutta" provision is being made for changing even the engines while the machine is afloat, special gantries being fitted to the upper wing for the purpose of handling the engines. When put into service on the Mediterranean section of the Empire air lines, this ability to spend all its time in port on the water should result in a material reduction in operating costs, and will probably soon pay for the extra cost of the stainless steel used in the hull construction.

The boat hull is of the shape made familiar by the older "Calcuttas," and it is to be noted that there are no outboard struts bracing the lower wings, which are bolted to wing roots built integral with the hull. These roots are of considerable thickness and are nicely faired into the hull, and their general "cleanness" should greatly reduce the amount of water spray thrown up while the machine is running on the water.

The internal accommodation of the four-engined "Calcutta" will differ slightly from that of the older machines. The cabin will have room for sixteen passengers, the seats being arranged in four transverse rows of four each. The mail compartment, ahead of the cabin, is designed to hold about 3,500 lb. of mails. At the request of Imperial Airways, Limited, the machine has been designed with a view to dividing the pay load approximately evenly between mails and passengers, and the normal pay load, when the machine is loaded to its full capacity, will thus be sixteen passengers and 3,500 lb. of mails. With this pay load the machine will have a cruising range of about 500 miles. The petrol tanks, housed in the upper wing, have a capacity of 720 gallons, but normally it is not intended that they shall be quite full, the fuel and oil weight foreseen for normal conditions being 3,860 lb. With this amount of fuel the cruising speed will be 100 miles an hour and the range 500 miles.

The four-engined "Calcutta" will be fitted with Bristol "Jupiter" engines of a new type, the XI BM, which is moderately supercharged to maintain ground-level power up to about 5,000 ft. This altitude, it is expected, will be the normal height at which the machines will fly, and would allow, for example, of clearing some of the mountainous districts in the Mediterranean over which the machines might be required to pass.

Structurally the new four-engined "Calcuttas" represent a considerable degree of engineering skill and refinement, in that for a tare weight of 17,900 lb. and a gross weight of 30,300 lb., the ratio of gross weight to tare weight is 1·69, which is good for a machine of this size and means that the disposable load which the machine can carry is 69 per cent. of its own weight. The estimated performance also is good, with a top speed at 5,000 ft. of 132 miles an hour and a take-off time with full load of 18 seconds.

Two New Supermarine Boats.

During 1930 the Woolston, Southampton, works of the Vickers Supermarine concern designed and laid down two new types, one of which, the "Seahawk," was referred to in last year's volume of the "Annual," while the other is a huge monoplane flying-boat which will exceed in size, if not in gross weight, anything hitherto built in any country. It is expected that both these flying-boats will be completed during the present year.

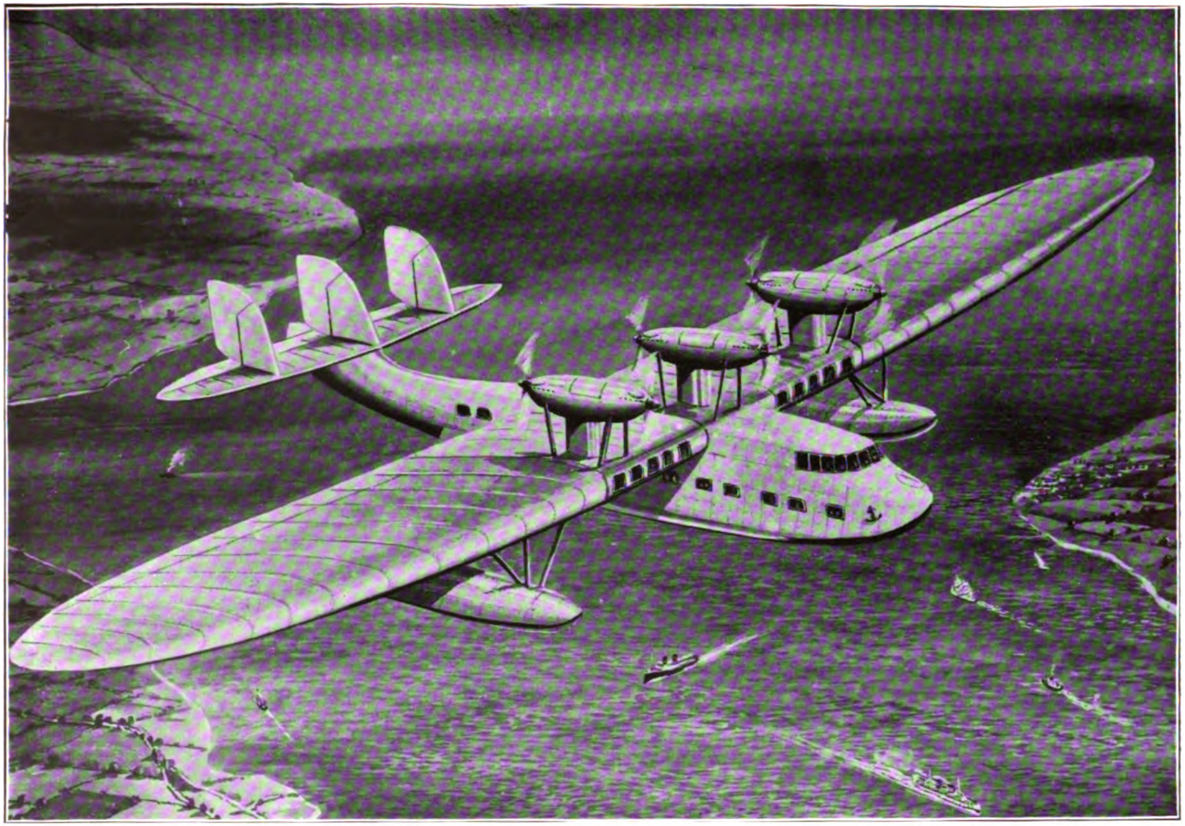
The six-engined flying-boat represents the most ambitious attempt to build a really large marine aircraft ever undertaken in this country. True, the new Supermarine monoplane will not reach the gross weight of the Dornier "Do. X," which has taken the air at something like 100,000 lb. weight, but this is because in this country we are not prepared to go to such high wing loadings and power loadings as those imposed upon the German machine. The new Supermarine may justly be claimed to mark a greater step forward than did the "Do. X," because, although the estimated gross weight is between 65,000 and 70,000 lb., the estimated wing loading is 18·75 lb. per sq. ft., compared with about 20 lb. per sq. ft. for the "Do. X," and the power loading 12·1 lb. per h.p. as compared with about 16¾ lb. per h.p. If these estimated figures are attained in practice, they indicate that at least one British firm is capable of producing a really large machine without resorting to excessive loading figures. This is merely another way of saying that the British boat will have a good speed range and a good reserve of power.

In general design the new Supermarine boat will resemble the "Do. X," in that it is a monoplane with the engines placed in tandem pairs on top of the wing. Here, however, the similarity ceases. The Supermarine monoplane will have only six engines (*i.e.* three pairs), compared with the 12 engines of the "Do. X," and in place of the wing stumps used by Dr. Dornier the Supermarine will have outboard floats strut-braced to the wings. Another difference will be found in the shape of the hull, which will conform more to normal British practice in its Vee-bottom steps and curved sides, instead of the flat sides and sharp-edged vertical stem of the "Do. X."

Structurally the Supermarine six-engined flying-boat will differ entirely from the German machine, in that rustless steel will be extensively employed. For example, the whole hull, including the planking, will be made of that material.

Powered by six Rolls-Royce "H" type engines of 900 h.p. each, the Supermarine monoplane will have luxurious accommodation for 40 passengers, and detachable bunks will provide sleeping accommodation for 20 passengers. The deck of the bows will be dropped so as to provide forward windows in the control cockpit, thereby giving the crew an excellent view in all essential directions, while the dropped forward deck will have a hatch for handling mooring gear, etc., the dropping of the forward deck bringing this hatch sufficiently low over the water to make it possible to reach the buoy with a boathook.

The Rolls-Royce engines, placed above the wing, will be carefully



SUPERMARINE SIX-ENGINED FLYING BOAT.

(Builders, Supermarine Aviation Works, Ltd., Southampton.)

streamlined, and a streamline shaft will run from the top of the wing surface to the underside of the engine housings, so that the engineers can get at any engine during flight to effect adjustments and temporary repairs.

Apart from the fact that rustless steel is to be used in the wing construction (the main spar being of this material), the wing will be metal covered except for the trailing edge part, which will be covered with fabric to save weight.

It is estimated that the tare weight of the machine will be 42,140 lb. With fuel for a flight of six hours' duration the estimated load is 7,850 lb. of petrol and oil, with a pay load of 12,200 lb. If the range is increased to twelve hours' duration the load may be 16,590 lb. of petrol and 1,050 lb. of oil, with a pay load of 6,800 lb.

The Supermarine monoplane will have an overall length of 107 ft., a wing span of 165 ft., a wing area of 3,400 sq. ft., and an overall height of 32 ft. It is calculated that the maximum speed will be in the neighbourhood of 155 miles an hour, and that the initial rate of climb will be 870 ft. a minute, with a service ceiling of 11,000 ft.

The Supermarine " Seahawk " is, more or less, the civilian version of the same firm's service type, the " Southampton X." In its layout the principle has been adopted of dividing the pay load up equally between mails and passengers with their luggage. Any other division can, of course, be made to suit other requirements. With the 50–50 division of the pay load the accommodation provides for ten passengers. Their cabin has a capacity of 600 cu. ft., while the volume of the mail compartment is 185 cu. ft. and that of the luggage hold 60 cu. ft.

The boat hull is of duralumin, with stainless steel fittings, and the biplane wings are of all-metal construction except for the fabric covering. Three Armstrong-Siddeley " Panther " engines, placed in line, provide the power, and the petrol tanks, placed in the top plane, give simple direct gravity feed.

The Supermarine " Seahawk " has a length of 60 ft., a wing span of 79 ft., and a wing area of 1235 sq. ft., and the tare weight is 11,260 lb. The permissible gross weight is 19,500 lb., and when a range of 300 miles is required the pay load, apart from weight of petrol, oil and crew, is 4,420 lb. If fuel and oil for a range of 500 miles are carried the pay load becomes 3,060 lb. The range of 300 miles corresponds to a fuel capacity of 250 gallons, and the 500 miles range to 400 gallons. The maximum petrol capacity is 580 gallons.

THE EDITOR OF " FLIGHT."

NAVAL REFERENCE SECTION.

STATEMENT TO ACCOMPANY NAVY ESTIMATES, 1930.

The Navy Estimates for 1930 show a reduction of £4,126,000 below the Estimates for 1929. Their net total is £51,739,000 as against £55,865,000 last year.

This substantial decrease is due mainly to the reductions which the Government have felt justified in making in the shipbuilding programmes of 1928 and 1929, in accordance with a policy which has already been stated to Parliament.

Although the decisions affecting shipbuilding have been announced as arrived at, it may be convenient to summarise them here:—

Five vessels of the programme of 1928 have been cancelled, viz.:

2 Cruisers (10,000-ton type, with 8-inch guns).
2 Submarines.
One Submarine Depôt Ship.

Twelve vessels of the programme of 1929 have been cancelled, viz.:

Two Cruisers (one of 10,000-ton type, with 8-inch guns).
Four Torpedo Boat Destroyers.
Three Submarines.
Two Sloops.
One Netlayer and Target Towing Vessel.

In addition, the decision whether the three remaining submarines of the 1929 programme are to be proceeded with has been deferred until after the London Naval Conference has been concluded.

If the full programmes of these two years had been put into effect, the New Construction provision in these Estimates must have risen by over £1,000,000 to the neighbourhood of £10,000,000 as compared with the provision of £8,621,626 in 1929. Actually the provision now proposed is £5,603,481. The effect of the changes is therefore to reduce expenditure on New Construction in these Estimates by over £4,000,000.

As to future shipbuilding, the Government have decided not to formulate any proposals until the results of the Naval Conference are known and have been fully considered. No provision, therefore, is included in these Estimates for commencing any further New Construction in 1930. As soon as the Government are in a position to inform Parliament of their intentions, a statement will be made on the subject and, if necessary, a Supplementary Estimate will be presented.

It should be noted, too, that in the case of the three Submarines which remain in the programme pending a final decision after the conclusion of the Naval Conference, these Estimates do not provide for any expenditure. If it should be found necessary to proceed with them, Parliament will be asked later in the year to make such additional financial provision as may be required.

Next to the reduction in the New Construction provision, the most noteworthy feature in these Estimates is the reduction which they forecast in Naval personnel.

Great attention has been paid by the Admiralty in recent years to the question of Fleet numbers, with the object of securing the greatest possible economy in personnel, without, of course, jeopardising essential requirements, including proper provision for training.

Vote A for 1929 provided for 99,800 officers and men, but it was explained that this, the maximum number to be borne during the year, was the anticipated bearing on April 1, 1929, and would fall to 98,800 by April 1, 1930.

As a result of further economies, the number now proposed to be reached by April 1, 1930, is 97,050, which is expected to fall to 94,000 by April 1, 1931.

Even allowing, however, for these two main factors, the presentation of Estimates so much lower than those of 1929 has only been rendered possible by a very close scrutiny of every service with the object of curtailing expenditure. Of the causes operating in the contrary sense, I should in particular mention the increase of expenditure under the Singapore Base main engineering contract. Although no new commitments are being entered into pending the result of the London Naval Conference, it has been found that it would not be economical to retard the work contracted for, and in accordance with the terms of the contract considerably larger payments will have to be made in the year 1930 than in the current financial year. This and other additional commitments falling upon 1930, such as the effect of periodic increments of salary, additional provision for cost-of-living bonus, the automatic growth of the Non-Effective Votes, additional purchases owing to the reduction in the quantities of stocks available for use in relief of cash expenditure, and the institution of the holiday week with pay for industrial staff, amount to about £1,000,000.

The Estimates which were presented in 1924 were subject to an overhead deduction, intended to discount in advance possible delay in the progress of contract work, and on the understanding that should such work proceed without interruption, the position would be dealt with when it arose. This system, with the approval of Parliament, has been adopted in every subsequent year. A similar deduction has been allowed for in 1930, regard being had to the smaller amount of contract work.

A. V. ALEXANDER.

ADMIRALTY,
March 3, 1930.

NOTES ON MATTERS OF GENERAL INTEREST.

DISTRIBUTION OF THE FLEET.

During the past year, in order to relieve the berthing congestion at Malta, four ships of the " Queen Elizabeth " Class have been transferred from the Mediterranean to Home waters. The battleships and battle cruisers comprising the Mediterranean and Atlantic Fleets during 1930 will thus be :—

Mediterranean Fleet.
One ship of the " Queen Elizabeth " Class.
Five ships of the " Royal Sovereign " Class.

Atlantic Fleet.
Two ships of the " Nelson " Class.
Two ships of the " Queen Elizabeth " Class.
Three Battle-Cruisers, the Renown, Repulse and Tiger.

The other two ships of the " Queen Elizabeth " Class are undergoing periodical repairs, but one is expected to rejoin the Atlantic Fleet by early Autumn. The Battle Cruiser Hood is also undergoing large repairs.

For reasons of economy, two ships of the " Iron Duke " Class which, under the title of the Third Battle Squadron, have formed part of the Atlantic Fleet and provided sea-going training for boys, have now been stationed at Portland for training purposes, where they form an independent command.

AIRCRAFT CARRIERS.

H.M.S. Glorious will complete for service in the Spring, and will join the Mediterranean Fleet early in the Summer in place of H.M.S. Courageous, which will join the Atlantic Fleet after undergoing refit. H.M.S. Argus will reduce to reserve status on the return of the Atlantic Fleet from the Spring Cruise.

CRUISERS.

The four 10,000-ton cruisers of the " London " Class have been completed, and now form the First Cruiser Squadron in the Mediterranean.

During 1930 the Norfolk, Dorsetshire, and York will complete and join the Second Cruiser Squadron in the Atlantic Fleet.

DESTROYERS.

The first complete flotilla of post-war design, i.e. the Flotilla-Leader Codrington and eight " Acasta " Class destroyers, will join the Mediterranean Fleet shortly, and relieve one of the flotillas now serving, which will return to England and be placed in reserve.

SUBMARINES.

The departure of the six " Odin " Class submarines for China has been delayed, but the first four will leave for China early in the year with the new Depôt ship Medway, and will be followed later by the remaining two and by the six " Parthian " Class submarines.

The Depôt ship Titania and the " L " Class Submarines have returned to England from China, and the Titania will relieve the Vulcan as Depot ship of the Sixth Submarine Flotilla, Portland.

During the year four submarines have been placed on the Disposal List, and one submarine was unhappily sunk in collision.

FLEET REPAIR SHIP.

The new Fleet Repair Ship Resource will shortly replace the Assistance in the Mediterranean. The latter has already returned home, and been placed in reserve.

SLOOPS.

The new Sloops Folkestone, Hastings, Penzance, and Scarborough will relieve four older sloops abroad—three in the Persian Gulf and one in the American and West Indies Station.

One old sloop has been placed on the Disposal List, and four more will be disposed of as a result of these changes.

FLEET ACTIVITIES ABROAD.

Mediterranean.—In June, the Aircraft Carrier Eagle, on passage to the Mediterranean, successfully searched for and rescued the Spanish Flying Boat Dornier 16.

In August, the situation in Palestine necessitated the despatch from Malta at short notice of units of the Mediterranean Fleet, viz., the Battleship Barham, Cruiser Sussex, Aircraft-Carrier Courageous, and two destroyers. The South Staffordshire Regiment was conveyed from Malta to Palestine in the Courageous. In addition to the troops, a total of 110 officers and 1,000 men and six flights of aeroplanes were landed from these vessels in Palestine. As soon as the situation allowed, this force was withdrawn, and the Naval units rejoined the Mediterranean Fleet.

In October, the Commander-in-Chief, Mediterranean Fleet, in his Flagship, H.M.S. Queen Elizabeth, with other vessels of the Fleet, visited Stamboul, and met with a most cordial reception.

America and West Indies.—Visits to United States ports and to various ports in South America have been carried out by ships of the American and West Indies Squadron. In every case our ships received a very warm welcome.

Red Sea and Persian Gulf.—Patrols by sloops in these waters have been carried out as in past years for the prevention of slave traffic and the protection of British interests.

China.—The difficult situation in China continues. Piracy is still prevalent, both on the high seas and on inland waters, and much of the responsibility for dealing with this menace to peaceful commerce has continued to fall upon the Navy.

Other events worthy of record were the visit of H.M.S. Ramillies to Cannes for the Centenary Celebrations; the visit of H.M.S. Ramillies and H.M.S. London to Barcelona at the time of the International Exhibition; the conveyance, by H.M.S. Suffolk, of H.R.H. the Duke of Gloucester from Hong Kong to Yokohama on the occasion of his mission to H.I.M. the Emperor of Japan; and the visit of H.M.S. Royal Oak to Santandar on the occasion of the presence of H.M. the King of Spain for the finish of the Plymouth to Santander Yacht Race.

FISHERY PROTECTION.

The vessels of the Fishery Protection and Minesweeping Flotilla have continued to carry out useful work in the general protection and assistance of the fishing fleets.

Useful exploratory work with the object of finding new fishing grounds has been carried out by H.M.S. Rosemary in conjunction with the Ministry of Agriculture and Fisheries. This work will be continued during the coming year.

Its importance has led to the decision of His Majesty's Government to build and equip a special vessel on the lines of the Discovery II with the object of extending the field of survey. The Admiralty will be responsible for the design and building of the vessel, which will be manned with Naval personnel, and fly the White Ensign.

CO-OPERATION BETWEEN THE SERVICES.

Combined exercises with the Army and Air Force have again been arranged as part of the annual programmes of squadrons whenever it has been possible to do so. Exchanges of officers between the three fighting services during tactical exercises have been arranged, and the experience gained has proved of considerable value.

NAVAL AIR WORK.

Good progress continues to be made in all branches of Naval Air Work, and the amount of flying carried out by embarked aircraft shows steady increase.

82 Naval Officers are now employed as observers, and 6 more are under training.

120 Naval and Royal Marine Officers are serving as pilots in the Fleet Air Arm, and 29 are under training for this duty. Of this total, 25 officers have been appointed for a period of general service, on the conclusion of which they will resume flying duties.

WIRELESS TELEGRAPHY AND SIGNAL DEVELOPMENT.

The working of Naval shore wireless telegraphy stations on both long and short wave has been improved during the past year by reorganisation and the use of recent developments in technique.

Ipswich and Sheerness Wireless Telegraphy Stations have been closed, and a new station for receiving purposes only will shortly be open at Flowerdon, near Winchester, utilising buildings and land relinquished by the Royal Air Force.

Certain modifications in apparatus are being made to effect greater control of emitted wireless waves, in order to comply with International requirements.

SINGAPORE BASE.

Reference has already been made to the progress of work on the main engineering contract, entered into in September, 1928, which, in spite of the fact that no new expenses are being incurred, renders it necessary to provide £220,000 more in these Estimates than was voted for the Base in 1929.

The Floating Dock is now in use, the first ship, the Cumberland, being docked on September 16.

PERSONNEL.

Reference has been made in the covering statement to the considerable reduction proposed to be effected under Vote A. The number to be reached by April 1, 1931, is one which it is considered possible to attain without recourse to extraordinary measures.

During the last year Lieutenant-Commanders, R.N., over the age of 40 and surplus to requirements, have been offered the opportunity of retiring voluntarily with special retirement terms. Sixty-eight officers availed themselves of the opportunity.

An annual medal and prize to be competed for by Junior Accountant Officers has been instituted from funds subscribed by the R.N. Accountant Officers' Dining Club. The award, known as the "Gedge Medal and Prize," is in commemoration of the late Staff-Paymaster J. T. Gedge, R.N., the first British Officer of all the fighting services to be killed in the late war.

Interchange of personnel and co-operation, especially for training purposes, continue between the R.N. and Dominion Navies. An interesting example of this is shown in the arrangement made between the Admiralty and the Australian Naval Board for Rear-Admiral G. F. Hyde, C.V.O., C.B.E., Royal Australian Navy, to command the Third Battle Squadron for a year from about May 1930.

Orders have been issued for Welfare Conferences to be assembled at an early date.

ADMINISTRATION.

Mr. A. W. Johns, C.B., C.B.E., has been appointed Director of Naval Construction in succession to Sir William J. Berry, K.C.B., who has retired on reaching the age of 65, after a distinguished career in the service of the Admiralty.

MATÉRIEL. NEW CONSTRUCTION.

The revised 1929 New Programme consists of:—

One 6-in. gun Cruiser.
One Leader.
Four Destroyers.
Four Sloops.
One Tender to H.M.S. Vernon.

(One of the small instructional Tenders to the Vernon is worn out and provision for its replacement has been included in the 1929 programme.)

These ships will all be of dockyard construction, except the Leader and two Destroyers, which will be built by contract.

The new Cruiser will be built at Devonport Dockyard. The two Dockyard-built Destroyers and the Tender to H.M.S. Vernon will be built at Portsmouth. Two of the Sloops were ordered in the late summer, one at Chatham and the other at Devonport. The remaining two Sloops will also be built at Chatham and Devonport. In addition, the new fishery survey vessel will be built at Chatham Dockyard. The cost of building and maintaining this vessel will be borne on the Votes of the Ministry of Agriculture and Fisheries.

Three Submarines are retained in the programme, but a decision as to proceeding with their construction will not be taken till after the conclusion of the Naval Conference.

CRUISERS.

"*London*" *Class* (1925 *Programme*).

H.M.S. London was completed in February 1929. H.M.S. Sussex carried out trials in December 1928 and was completed in March 1929. H.M.S. Devonshire carried out trials in January 1929 and was completed in April 1929. H.M.S. Shropshire carried out trials in July 1929 and was completed in September 1929. H.M.S. Devonshire has recently been in hand at Devonport for repairs consequent on the gun accident in "X" turret, but has now completed and returned to her station.

"*Dorsetshire*" *Class* (1926 *Programme*).

The construction of the two vessels of this class is progressing satisfactorily. The Norfolk will shortly have carried out her trials and should complete early next financial year.

The Dorsetshire is due to carry out trials next June, and to complete next September.

"*B*" *Class* (1926 *and* 1927 *Programmes*).

The York is carrying out her trials and is expected to complete at the end of April.

The Exeter's construction is progressing normally, and she is expected to complete in 1931.

LEADERS AND DESTROYERS.

1927 *Programme*.

The Leader Codrington, completing at Messrs. Swan Hunter's, should be delivered in May 1930.

The more advanced Destroyers of the "Acasta" Class have commenced their trials and have shown a gain in fuel economy, as compared with earlier designs, owing to the introduction of superheating and other design improvements.

The Acheron, which, it will be remembered, is building by Messrs. Thornycroft's to the order of Messrs. Parsons, and is to be fitted with special machinery designed to make use of high-pressure steam, will probably be completed in the autumn of 1930.

The remaining vessels of the "Acasta" Class will be completed for service very shortly.

1928 *Programme*.

The Leader Keith, building at Messrs. Vickers-Armstrong's, is proceeding satisfactorily and should be launched and completed during the financial year 1930.

The Destroyers of "Beagle" Class, namely, the Basilisk and Beagle, building at Messrs. John Brown's; the Blanche and Boadicea, building at Messrs. Hawthorn, Leslie's; the Brilliant and Bulldog, building at Messrs. Swan Hunter's; and the Boreas and Brazen, at Messrs. Palmer's, are proceeding satisfactorily, and it is anticipated that all these vessels will be launched and completed during the financial year 1930.

The Canadian Government has ordered two Destroyers from Messrs. Thornycroft to the firm's design. Their construction is being supervised by the Admiralty. It is anticipated that they will be launched during 1930 and delivered early in 1931.

SUBMARINES.

Four of the six vessels of the "Odin" Class (1926 Programme) will have been completed during the financial year 1929. It is anticipated that the remaining two vessels (the Olympus and Orpheus) will complete early in the financial year 1930.

The six vessels of the "P" Class (1927 Programme) will, it is expected, all have been completed by the early autumn of 1930.

Of the six vessels of the "R" Class (1928 Programme) originally ordered, two were cancelled, leaving three (the Regent, Regulus, and Rover) building at Messrs. Vickers-Armstrong's, and one (the "Rainbow") building at Chatham Dockyard. It is expected that three of these vessels will complete during the financial year 1930.

SUBMARINE DEPOT SHIP.

The Medway was completed in July 1929.

FLEET REPAIR SHIP.

The Resource was completed in January 1930.

SLOOPS.

The Bridgewater and Sandwich have been completed during the past year and have joined the Fleet.

Four repeat Sloops, the Hastings, Penzance, Folkestone, and Scarborough, are under construction, the first two at Devonport Dockyard, and the others at Messrs. Swan Hunter's, and are expected to be ready for trials in the summer.

A Sloop, to be named the Hindustan, is being built for the Government of India at Messrs. Swan Hunter's, under Admiralty supervision, and is also expected to be ready for trials in the summer, and to sail for India in the autumn.

RIVER GUNBOAT (1928 PROGRAMME).

The order for this China River Gunboat (the Falcon) has been placed with Messrs. Yarrow, and the ship is due for delivery in April 1931.

RECONSTRUCTION AND REPAIRS.

The reconstruction of the Glorious as an aircraft carrier is practically finished. She is the last of the three large Aircraft Carriers converted from Cruisers, the other two being the Furious and Courageous.

The Valiant, which was taken in hand for bulging in March 1929, is expected to complete in the autumn. The Barham, the last ship of the Class to be bulged, will then be taken in hand.

The Hood and the Benbow commenced large refits in June and September 1929 respectively.

The Courageous is about to be taken in hand for fitting new water pockets and boiler tubes, and it is intended to commence similar work on the Furious during 1930.

DOCKYARD ADMINISTRATION.

The process of putting into force at Portsmouth Dockyard the changes recommended by Mr. R. S. Hilton's Committee on the Financial System of the Dockyards will be completed by the April 1 next. Amongst the changes introduced are the system of mustering the workmen by time-clock instead of metal ticket—the time-clock card being completed with the detail of the calculation of each workman's wages, and given to him for information—and a scheme of recording and classifying on-costs under centres, from which analyses are prepared for each period of four weeks for the purposes of instituting a closer control by the management over indirect expenditure. It is proposed gradually to extend these systems to other establishments, and to start upon their introduction at Devonport Dockyard in 1930.

In accordance with the policy of the Government towards its industrial employees, one week's annual leave with pay has been granted to all workpeople in the Royal Dockyards and other Admiralty Establishments in this country who have been in the Admiralty service for a year, and the number of paid holidays each year has been increased from four to five.

The reduction in the amount of work allocated to the Dockyards owing to the cancellation of part of the Shipbuilding Programme would, in the ordinary course, have involved considerable discharges. To such extent, however, as is practicable, measures have been taken to minimise compulsory discharges. A certain amount of work which has not ordinarily been assigned to the Dockyards, but which they are well able to perform, has been found for them. Established workpeople wishing to leave the Service have been permitted to retire with the pension or gratuity earned by service. The amount of overtime worked in the Dockyards has been severely restricted. Payment by results has been to some extent reduced.

SELF-MAINTENANCE SCHEME (H.M. SHIPS).

The scheme introduced in 1927 in the Mediterranean Fleet for increasing the degree of self-maintenance by ships' personnel in conjunction with an extension of the periods between dockyard refits, continues to work very satisfactorily. A similar scheme was extended later to the Atlantic Fleet.

A modified scheme of self-maintenance has been authorised for trial in the Cruisers of the America and West Indies Squadron.

MISCELLANEOUS.

Catapults for the launching of aircraft from ships are now installed in several vessels, including the Resolution and Frobisher, but finality in design has not yet been reached. Several types are being exhaustively tried out, and experimental work is being pursued, active liaison being maintained with the Air Ministry. The trials are being carried out from the Ark Royal.

Considerable progress has been made in modernising the anti-aircraft defence of the Fleet and in installing a new system of fire control for the anti-aircraft guns.

Improved fuel economy and reliability continue to be sought after in all new machinery designs. Increasing use is being made of electrically-driven auxiliary machinery, with the object of securing improvement in economy when working at reduced powers. Useful work, which should prove the means of further improving fuel combustion afloat besides improving operation and reducing wear and tear of furnace fittings, has been carried out during the year at the Haslar Liquid Fuel Experimental Works.

At the Admiralty Engineering Laboratory the development of heavy oil engines for naval purposes has proceeded steadily. The design and construction of an advanced experimental type of high-speed Diesel engine, in which an attempt is being made to reduce the machinery weight considerably in comparison with existing practice, are also in progress there. In addition, data required for existing designs have been determined experimentally as required, and metallurgical investigations have been carried out to meet the requirements of the Service.

Trials of oil obtained from the low-temperature carbonisation of coal have been carried out at the Liquid Fuel Experimental Works at Haslar and in a Destroyer, and arrangements are being made to obtain supplies of similar oils from the principal firms in this country with a view to carrying out further trials.

Progress in the development of the use of pulverised fuel is being closely watched.

Trials have also been continued at Haslar and elsewhere with plants for eliminating the oil fuel from the water in the mixtures arising from fuel tank washings and other contaminated supplies. Improvements in these processes have been made and several plants are now available for service.

Trials have been carried out ashore and afloat with various new materials and corrosion-resisting processes.

The development of light alloys in replacement of heavier materials is another matter which is being closely followed, and various investigations and trials are in progress.

In conjunction with British Electrical Cable Manufacturers a comprehensive research and investigation into the construction of various types of electric cables have been undertaken, resulting in the production of cables of greater durability, which should ultimately effect considerable economy in maintenance.

Successful experiments have been carried out with a Submarine Escape Apparatus which offers a greatly improved means of individual escape to the crew of a sunken submarine, and the provision of this apparatus to each officer and man in submarines is in progress. Other experiments have been made, and are continuing, with the object of improving measures of submarine salvage in case of necessity, an important feature being that means have been found to enable Divers to reach much greater depths than had previously been considered practicable.

A. V. A.

ABSTRACT OF NAVY ESTIMATES FOR 1930.

Votes.		Estimates 1930.		Estimates 1929.
		Gross Estimate.	Net Estimate.	Net Estimate.
	I.—NUMBERS.		Maximum Numbers.	Maximum Numbers.
A	Number of Officers, Seamen, Boys, and Royal Marines	97,050	97,050	99,800
	Number of Royal Marine Police . .	500	500	500
	II.—EFFECTIVE SERVICES.	£	£	£
1	Wages, etc., of Officers and Men of the Royal Navy, and Royal Marines, and Civilians employed on Fleet Services	14,049,102	13,990,000	14,244,000
2	Victualling and Clothing for the Navy .	4,417,700	3,679,000	3,873,400
3	Medical Establishments and Services .	468,210	403,200	420,000
4	Fleet Air Arm	1,267,000	1,267,000	1,300,000
5	Educational Services	307,879	231,200	232,200
6	Scientific Services	561,210	480,800	470,400
7	Royal Naval Reserves . . .	392,297	392,000	392,000
8	Shipbuilding, Repairs, Maintenance, etc.:			
	Section I.—*Personnel* . .	6,683,429	6,209,000	6,770,000
	Section II.—*Matériel* . .	5,878,500	4,127,300	5,021,300
	Section III.—Contract Work .	5,017,180	4,984,000	7,228,300
9	Naval Armaments	3,891,473	3,366,800	3,544,000
10	Works, Buildings, and Repairs at Home and Abroad	2,621,350	2,073,950	1,907,700
11	Miscellaneous Effective Services .	786,700	706,850	721,800
12	Admiralty Office	1,224,840	1,208,500	1,187,000
	Total Effective Services . £	47,566,870	43,069,600	47,312,100
	III.—NON-EFFECTIVE SERVICES.			
13	Naval and Marine, Officers . . .	3,138,204	3,120,000	3,068,500
14	Naval and Marine, Men . . .	4,600,300	4,567,200	4,527,000
15	Civil Superannuation, Compensation Allowances, and Gratuities . .	984,765	982,200	957,400
	Total Non-Effective Services . £	8,723,269	8,669,400	8,552,900
	GRAND TOTAL . . £	56,290,139	51,739,000	55,865,000

NET DECREASE . . . . . £4,126,000.

ADMIRALTY, *Feb.* 19, 1930.	A. V. ALEXANDER. CHARLES E. MADDEN. M. H. HODGES.	ROGER BACKHOUSE. V H. HAGGARD. W. W. FISHER.	CHARLES G. AMMON. G. H. HALL. O. MURRAY.

STATEMENT SHOWING THE NUMBERS BORNE, THE EXPENDITURE ON NAVAL SERVICES FOR THE YEARS 1917 TO 1928, AND THE ESTIMATES FOR 1930 AND 1931.

Year.	Vote A. — Average numbers borne. (a)	Vote 1. — Wages, &c., of Officers, &c.	Vote 2. — Victualling and Clothing.	Vote 3. — Medical Establishments, &c.	Vote 4. — Civilians employed on Fleet Services,	Vote 5. — Educational Services.	Vote 6. — Scientific Services.	Vote 7. — Royal Naval Reserves.	Vote 8. — Shipbuilding, Repairs, Maintenance, &c.			Vote 9. — Naval Armaments.	Vote 10. — Works.	Vote 11. — Miscellaneous.	Vote 12. — Admiralty Office.	Vote 13. — Half Pay, &c.	Vote 14. — Naval, &c., Pensions.	Vote 15. — Civil Superannuation, &c.	Balances Irrecoverable.	Total Expenditure.
									Section I. Personnel.	Section II. Matériel.	Section III. Contract Work.									
		£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
1917	406,977	37,559,536	13,481,159	792,569	561,308	210,243	152,160	874,930	12,660,160	36,494,694	70,609,055	34,177.359	6,556,799	9,193,802	1,454,835	709,227	1,446,247	413,746	41,092	227,388,891
1918	381,311	46,373,511	24,219,351	1,158,237	491,270	247,922	262,886	871,970	15,037,763	59,128,675	94,248,874	64,866,784	10,928,241	9,357,532	1,985,894	704,914	3,733,778	445,485	28,090	334,091,227
1919	176,087	32,385,306	8,823,106	733,046	556,778	401,864	364,832	458,044	12,426,177	*Credit :—* *785,986*	48,348,933	14,441,835	5,595,608	11,118,631	2,042,715	1,176,937	15,133,064	802,279	60,875	154,084,044
1920	124,009	21,314,360	8,311,708	683,830	759,110	503,152	249,185	359,694	12,096,747	6,799,965	12,001,445	8,493,951	4,992,969	5,724,974	2,078,764	2,352,344	4,847,475	880,996	23,611	92,505,290
1921	127,180	19,220,859	6,831,481	643,735	480,243	405,592	359,575	423,056	10,690,188	8,835,771	4,834,336	6,253,468	4,746,485	3,506,514	1,780,641	2,002,201	3,881,368	1,020,693	69,985	75,986,141
																Non-effective Services.				
																Officers.	Men.			
1922	107,782	15,762,232	4,767,118	492,419	258,600	382,065	354,961	423,722	7,075,533	3,877,716	3,225,598	3,678,783	3,553,831	2,096,219	1,371,961	3,701,984	5,471,088	968,880	29,679	57,492,389
1923	99,107	14,175,111	4,153,803	410,842	193,793	330,644	379,489	459,391	6,751,496	5,521,336	4,427,874	3,840,606	3,215,766	982,173	1,247,813	2,856,764	4,260,245	823,340	33,864	54,064,350
1924	99,453	14,150,863	4,152,902	442,756	190,669	334,648	393,054	446,902	7,489,659	5,592,183	5,415,210	3,507,190	3,140,887	1,065,869	1,349,519	2,868,798	4,328,526	811,797	12,356	55,693,787
1925	100,284	14,576,499	4,226,570	440,209	Fleet Air Arm (b) 1,320,000	327,226	417,552	465,114	7,929,259	6,905,184	6,395,406	4,247,113	2,422,050	826,119	1,307,790	2,812,336	4,449,585	928,326	8,110	60,004,548
1926	100,791	14,322,678	4,236,846	434,919	681,000	324,036	393,339	444,759	7,487,952	5,422,141	7,275,173	3,595,037	2,108,441	930,369	1,203,639	2,914,419	4,450,140	894,472	23,002	57,142,862
1927	101,916	14,568,462	4,182,491	423,777	882,000	224,334	402,976	419,086	7,067,419	4,678,052	8,839,423	3,996,749	1,900,788	844,852	1,233,132	2,966,485	4,525,353	965,602	2,276	58,123,257
1928	100,680	14,435,347	3,992,639	418,863	1,008,300	226,486	396,298	403,295	6,743,571	5,074,290	8,263,060	3,871,235	1,950,207	728,841	1,181,125	3,000,321	4,496,310	944,735	4,223	57,139,146
1929 (Estimate)	99,800(c)	14,244,000	3,873,400	420,000	1,300,000	232,200	470,400	392,000	6,770,000	5,021,300	7,228,300	3,544,000	1,907,700	721,800	1,187,000	3,068,500	4,527,000	957,400	—	55,865,000
1930 (Estimate)	97,050(c)	13,990,000	3,679,000	403,200	1,267,000	231,200	480,800	392,000	6,209,000	4,127,300	4,934,000	3,366,800	2,073,950	706,850	1,208,500	3,120,000	4,567,200	982,200	—	51,739,000

Note.—The figures for Expenditure represent the Net Expenditure after taking into account receipts noted in the Navy Appropriation Account as receipts in excess of estimated Appropriations in Aid.

(*a*) Exclusive of Royal Marine Police.

(*b*) Replacing "Civilians employed on Fleet Services," transferred to Vote 1 in 1925.

(*c*) Maximum for the year.

EXPENDITURE FOR NAVAL PURPOSES OF THE PRINCIPAL FOREIGN POWERS.

UNITED STATES NAVY.

APPROPRIATION BILL, 1930 (July 1, 1930, to June 30, 1931).

Appropriation Title.	Appropriations.	
	1931. Dollars.	1930. Dollars.
Salaries, office of the Secretary of the Navy	201,760	189,280
Salaries, General Board	12,960	12,760
Salaries, Naval Examining Board	10,160	10,160
Salaries, Compensation Board	8,640	8,640
Contingent expenses, Navy Department	104,100	83,100
Printing and binding	625,000	525,000
Pay, Miscellaneous	1,525,000	1,500,000
Contingent, Navy	30,000	40,000
Temporary government, West Indian Islands	421,000	314,000
State Marine Schools	100,000	75,000
Care of lepers, Guam	35,000	35,000
Operation and conservation of Naval Fuel Reserves	175,000	—
Naval Research Laboratory	230,000	222,350
Salaries, office Naval Records and Library	39,000	38,640
Salaries, office of Judge Advocate General	134,880	132,140
Salaries, office of Chief of Naval Operations	72,780	72,160
Salaries, Board of Inspection and Survey	21,020	20,860
Salaries, Naval Communications	133,060	132,000
Salaries, Office of Naval Intelligence	41,060	40,780
Recreation for enlisted men	732,000	400,000
Contingent, navigation	10,000	10,000
Gunnery and engineering exercises	46,950	46,950
Instruments and supplies	592,000	592,000
Ocean and lake surveys	85,800	85,800
Naval training station, California	180,000	180,000
Naval training station, Rhode Island	240,000	235,000
Naval training station, Great Lakes	279,000	279,000
Naval training station, Hampton Roads	235,000	230,000
Naval Reserve	4,720,000	4,740,000
Naval Reserve Officers' Training Corps	130,000	105,000
Naval War College	115,000	490,700
Salaries, Bureau of Navigation	496,320	114,000
Salaries, Hydrographic Office	425,180	391,140
Contingent and miscellaneous expenses, Hydrographic Office	150,040	86,000
Salaries, Naval Observatory	195,380	43,200
Contingent and miscellaneous expenses, Naval Observatory	33,700	178,560
Grounds and roads	—	3,600
Salaries, Nautical Almanac Office	—	25,700
Engineering	20,101,400	19,686,300
Engineering Experimental Station, Annapolis	175,000	175,000
Salaries, Bureau of Engineering	316,220	310,160
Construction and repair of vessels	17,941,300	17,927,500
Salaries, Bureau of Construction and Repair	388,780	388,580
Ordnance and ordnance stores	11,669,400	11,669,400
Purchase and manufacturing of smokeless powder	1,000,000	1,000,000
Torpedoes and appliances	450,000	450,000

UNITED STATES NAVY—*continued.*

Appropriation Title.	Appropriations. 1931. Dollars.	Appropriations. 1930. Dollars.
Salaries, Bureau of Ordnance	160,360	157,620
Pay, Subsistence and transportation	156,484,500	159,927,282
Maintenance, supplies and accounts	10,205,000	4,975,500
Fuel and transportation	9,600,000	9,856,118
Salaries, Bureau of Supplies and Accounts	861,000	855,000
Medical Department	2,080,000	2,066,500
Care of the dead	75,000	75,000
Salaries, Bureau of Medicine and Surgery	86,280	79,740
Maintenance, Yards and Docks	8,000,000	7,639,300
Contingent, Yards and Docks	125,000	125,000
Salaries, Bureau of Yards and Docks	312,920	311,100
Public works	10,814,600	5,197,350
Aviation, Navy	32,033,211	31,430,000
Salaries, Bureau of Aeronautics	287,240	285,420
Pay, Naval Academy	915,000	896,930
Current and miscellaneous expenses, Naval Academy	90,000	90,000
Maintenance and repairs, Naval Academy	1,000,000	1,000,000
Pay, Marine Corps	16,321,125	16,083,758
Pay, civil employees, Marine Corps	302,507	292,787
General expenses, Marine Corps	8,897,173	8,605,332
Alteration to naval vessels	—	450,000
Increase of the Navy—C. and M. Increase of the Navy, A. A. and A.	49,965,000	47,120,000
Modernization of vessels	7,400,000	7,400,000
Total Annual appropriations	380,644,786	368,215,197
Total Permanent and indefinite	1,851,550	1,844,550
Total	382,496,336*	370,059,747*

* The par rate of exchange is $4·866 to the £.

IMPERIAL JAPANESE NAVY.

ESTIMATES, 1930–31 (April 1, 1930, to May 31, 1931).

The Estimates of the Imperial Japanese Navy are divided under two headings "Ordinary" and "Extraordinary."

The figures for 1930–31 as compared with the previous year are as follows:—

	1930–31. Yen.	1929–30. Yen.
Ordinary	151,161,906	147,971,128
Extraordinary	111,775,782	113,137,761
Total	262,937,688†	261,108,889†

The "Ordinary" expenditure is for pay, provisions, etc., and the general upkeep of the Fleet and its Air Service, and the "Extraordinary" expenditure for new construction and additions and improvements to the present Fleet and its Air Service and establishments.

† The par rate of exchange is 9·75 yen to the £.

FRENCH NAVY.

ESTIMATES, 1930–31.

The figures for 1930-31, including the votes for new construction, as compared with the previous year, are as follows:—

	1930-31. Francs.	1929-30. Francs.
Ordinary	1,233,298,434	—
Extraordinary	1,489,442,955	—
Total	2,722,741,389*	2,759,858,025*

* The par rate of exchange is 124·21 frs. to the £.

ROYAL ITALIAN NAVY.

ESTIMATES, 1930–31.

(July 1, 1930—June 30, 1931.)

	1930-31. Lire.	1929-30. Lire.
ORDINARY EXPENDITURE.		
General Expenses	—	4,524,000
Pensions	—	83,070,000
Education	—	3,490,000
Lighthouses and Pilotage	—	5,720,000
Maintenance, Construction, Armaments, Establishments, and Coast Works	—	864,012,000
Supplementary	—	23,020,000
Total	1,213,667,000	983,836,000
EXTRAORDINARY EXPENDITURE.		
General expenses of the Navy and Various	371,014,000	227,633,630
Total	1,584,681,000	1,211,469,630

* The par rate of exchange is 92·46 lire to the £.

GERMANY.

(April 1, 1930—March 31, 1931.)

	1930-31. Reich Marks.	1929-30. Reich Marks.
Ordinary	135,980,800	134,159,260
Extraordinary	52,643,900	46,016,600
Total	188,624,700	180,175,860

Par rate 20·4 Reich marks to £1 sterling.

BRITISH AND FOREIGN NAVIES.

PRINCIPAL OFFICIALS.

Great Britain.

First Lord.—The Right Hon. Albert Victor Alexander, M.P.

First Sea Lord and Chief of Naval Staff.—Admiral Sir Frederick L. Field, K.C.B., K.C.M.G.

Second Sea Lord and Chief of Naval Personnel.—Admiral Sir Cyril T. M. Fuller, K.C.B., C.M.G., D.S.O.

Third Sea Lord and Controller.—Vice-Admiral Roger R. C. Backhouse, C.B., C.M.G.

Fourth Sea Lord and Chief of Supplies and Transport.—Vice-Admiral Lionel G. Preston, C.B.

Deputy Chief of Naval Staff.—Vice-Admiral Frederic C. Dreyer, C.B., C.B.E.

Civil Lord.—George Henry Hall, Esq., M.P.

Parliamentary and Financial Secretary.—Charles George Ammon, Esq., M.P.

Permanent Secretary.—Sir Oswyn A. R. Murray, K.C.B.

Foreign Powers.

Country.	Minister of Marine.	Chief of Staff.
Argentina . .	Vice-Admiral (retd.) Zurueta	Capt. R. Camino
Brazil . . .	Rear-Admiral A. S. Pinto da Luz	Vice-Admiral José Maria Penido
Chile	Rear-Admiral E. von Schroeders	Rear-Admiral Alejandro Garcia
China . . .	Admiral Yang Shu-Chwang	
Denmark . .	Monsieur Rasmussen	Rear-Admiral H. Rechnitzer
France . . .	G. Dumesnil	Vice-Admiral L. H. Violette
Germany . .	General W. Groener	Admiral Dr. Raeder
Greece . . .	D. Botsaris	Rear-Admiral G. Panas
Italy	Am. di Divisione G. Sirianni, C.M.G.	Am. di Squadron E. Burzagli, C.B.
Japan	Admiral Baron K. Abo	Admiral N. Tanaguchi, K.C.M.G.
Netherlands . .	Dr. L. N. Deckers	Vice-Admiral J. C. Jager
Norway . . .	Mons. T. Anderssen-Rysst	Rear-Admiral Von der Lippe
Peru	Sr. Nunez Chavez	Rear-Admiral W. S. Pye (Captain, U.S.N.)
Poland . . .	Rear-Admiral Augusto Loayza	Captain J. Swirski
Portugal . . .	Captain Magalhaes Correia	Rear-Admiral Mariano da Silva
Soviet Union .	N. E. Voroshilov (President, Committee of Defence)	R. A. Muklevitch
Spain	Rear-Admiral D. Salvador Carvia y Caravaca	Vice-Admiral D. Jose Nunez Quijano
United States .	Charles F. Adams	Admiral W. V. Pratt
Siam	V.-A. H.S.H. Prince Toom	R.-A. Phra Rajvangsang
Sweden . . .	C. G. Ekman	Commodore N. E. F. Selander

Corrected to December, 1930.

BRITISH AND FOREIGN NAVAL ATTACHÉS.

BRITISH NAVAL ATTACHÉS ACCREDITED TO FOREIGN COUNTRIES.

To:—

Albania, Bulgaria, Greece, Italy, Yugoslavia, Roumania, and Turkey: Naval Attaché, Captain R. H. L. Bevan, D.S.O., M.V.O. (appointed 28th April, 1928); Headquarters, Rome, Italy.

Belgium, France, Netherlands, Portugal and Spain: Naval Attaché, Captain G. W. Hallifax (appointed 15th October, 1928); Headquarters, Paris, France.

Denmark, Esthonia, Finland, Germany, Latvia, Lithuania, Norway, Poland and Sweden: Naval Attaché, Commander M. A. Hawes (appointed 4th April, 1929); Headquarters, Berlin, Germany.

Japan and China: Naval Attaché, Captain M. G. B. Legge, D.S.O. (appointed 27th December, 1929); Assistant Naval Attaché Engineer Commander C. B. Evington (appointed 4th June, 1930): Headquarters, Tokyo, Japan.

U.S.A., Cuba, Mexico, and Panama: Naval Attaché, Captain J. S. M. Ritchie (appointed 7th March, 1928); Assistant Naval Attaché, Engineer-Commander W. C. Horton (appointed 8th September, 1928): Headquarters, Washington, U.S.A.

South America, including the Argentine Republic, Brazil, Chile, Ecuador, Peru, and Uruguay: Naval Attaché, Captain E. de F. Renouf (appointed 15th August, 1930).

FOREIGN NAVAL ATTACHÉS ACCREDITED TO GREAT BRITAIN.

From:—

Argentine Republic: Naval Attaché (none at present).

Brazil: Naval Attaché, Commander Clodoven Celestino Gomes, Abford House, Wilton Road, London, S.W.1.

Chile: Naval Attaché (none at present).
3, Hamilton Place, Park Lane, London, W.1.

Denmark: Naval Attaché (Post vacant):

France: Naval Attaché, Capitaine de Vaisseau, Comte de Ruffi de Pontevès-Gévaudan, D.S.O.; Assistant N.A., Lieutenant Commander André Bron: Address. Albert Gate House, Hyde Park, London, S.W.1.

Greece: Naval and Air Attaché, Captain Demetrius Phocas; Assistant N. & A. A., Commander Evanghelos Roussos: Address, Flat B, Upper Feilde, Park St., London, W.1.

Italy: Naval Attaché, Captain Count Ettore Sommati di Mombello; Assistant N.A., Lieutenant Commander Count Ferranti Capponi: Address, 7, Onslow Gardens, S.W.7.

Japan: Naval Attaché, Captain Prince Tadashige Shimadzu I.J.N.; Assistant Naval Attaché, Lieutenant Commander Masao Nishida, I.J.N.: Address, Broadway Court, Westminster, London, S.W.1.

Norway: Naval Attaché (Post vacant): Address, Offices of the Norwegian Legation, 21-24, Cockspur Street, London, S.W.1.

Peru: Naval Attaché, Captain Don Manuel D. Faura: Address, Peruvian Legation, 65, Cadogan Square, London, S.W.1.

Roumania: Commander Gheorghe Niculescu, 4, Cromwell Place, London, S.W.7.

Serbs, Croats and Slovenes (Kingdom of): Naval and Air Attaché, Captain Vladimir Mariasevic: Address, c/o Yugo-Slavian Legation, 195, Queen's Gate, London, S.W.7.

Spain: Naval Attaché, Capitan de Corbeta Don Juan Pastor y Tomasety: Address, 64, Victoria Street, London. S.W.1.

Sweden: Naval Attaché, Captain E. A. Öberg: Address, Swedish Legation, 27, Portland Place, London, W.1.

United States of America: Naval Attaché, Captain W. W. Galbraith, U.S.N.; Assistant Naval Attachés, Commander R. T. Hanson (C.C.), Lieutenant Commander G. D. Murray, U.S.N., Lieutenant Commander Howard E. Kingman, U.S.N., Lieutenant J. O. Huse, U.S.N.: Address, 6, Grosvenor Gardens, Westminster, London, S.W.1.

Uruguay: Naval Attaché (Post vacant).

DIMENSIONS AND PARTICULARS
OF
BRITISH AND FOREIGN WARSHIPS.

LIST OF BRITISH AND FOREIGN SHIPS.

Warships are arranged alphabetically, except in certain cases in which vessels of the same class have been kept together. The following abbreviations are used throughout the List:—

a.c.	Armoured cruiser.
a.g.b.	Armoured gunboat.
b.	Battleship.
b.c.	Battle-cruiser.
l.cr.	Light cruiser.
Flot. ldr.	Flotilla leader.
c.d.s.	Coast-defence ship.
P. L. Cr.	Protected light cruiser.
M.Cr.	Minelaying cruiser.
cr.	Cruiser.
A.A.	Anti-aircraft guns. (H.A. = High angle)
A.C.	Aircraft carrier.
A.T.	Aircraft tender.
g.b.	Gunboat.
g.v.	Gun-vessel.
H.A.	High angle = A.A. Anti-aircraft.
H.N.S.	Harvey nickel steel.
H.S.	Harveyised or similar hard-faced steel.
K.S.	Krupp steel.
p.v.	Patrol vessel.
t.	Turret-ship (in class column).
t.	Speed and H.P. at trials (in speed and H.P. columns).
to.cr.	Torpedo-cruiser.
to.g.b.	Torpedo-gunboat.
L.	Light guns under 15 cwt., including boats' guns.
M.	Machine guns.
sub.	Submerged torpedo tube.

The following abbreviations are used to distinguish the various types of boilers:—

W.T.	Water-tube boilers, where the type is not known.
B.	Belleville.
Bl.	Blechynden.
B. & W.	Babcock and Wilcox.
D'A.	D'Allest.
My.	Myabara.
N. or Nic.	Niclausse.
Nor.	Normand.
N.S.	Normand-Sigaudy.
T.	Thornycroft.
T.S.	Thornycroft-Schulz.
Y^1.	Yarrow small tube.
Y^2.	Yarrow large tube.

The following abbreviations distinguish types of turbines:—

P.T.	Parsons.
(G.)	Geared turbines.
C.T.	Curtis.
B.C.T.	Brown-Curtis.

A reference is now given in the tables to the pages (marked P1, P2, etc., towards the end of the volume) on which names of the ships appear.

GREAT BRITAIN.—Armoured Ships.

Class.	NAME. DATE FOR SCRAPPING	Standard Displacement. (Washington Treaty.)	Length. (Extreme.)	Beam (Extreme.)		Normal Draught.		Horse-Power.	Where Built.	Makers of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Fuel. Coal. / Oil.	Complement (War).
														Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Second-ary.	Guns	Torpedo Tubes.			
		tons.	ft.	ft.	ins.	ft.	ins.						£	in.	in.	in.	in.	in.	in.			knots.	tons	
b.	**Barham** . 1935 *See p.* P25.	30,000	643¾	90	6	31	3	75,000 B. & W.	Clydeb'nk	J. Brown B.C.T.	1914	1915	2,408,000	13–6	3–1	6	4–2	11	6	8 *15-in.*, 12 *6-in.*, 4 *4-in.* A.A., 4 *3-pr.*; 5 M.; 10 L.	4 (sub.)	25	— 3400	1126
b.	**Emperor of India** † . 1934 *See p.* P26.	26,250	624½	90	0	28	0	29,000 Y.	Barrow .	Vickers . P.T.	1913	1914	2,020,017*	12–8	1–2½	9–8	1–1½	11	6	10 *13·5-in.*, 12 *6-in.*, 4 *3-pr.*, 2 *3-in.* A.A.; 5 M.; 10 L.	4 (sub.)	21	3250 1050	1145
b.c.	**Hood** . 1941 *See p.* P27.	42,100	860¾	105	3	28	6	144,000	Clydeb'k	J. Brown . B.C.T. (G.)	1918	1920	5,843,039*	12–6	3–1	7–5	5–4	11	(*a*)	8 *15-in.*, 12 *5·5-in.*, 4 *4-in.* A.A., 4 *3-pr.*; 5 M.; 10 L.	4 (deck) 2 (sub.)	31	— 4000	1341
b.	**Iron Duke** § . 1934 *See p.* P26.	26,250	623¾	90	0	28	0	29,000 B. & W.	Portsm'th	Cammell Laird P.T.	1912	1914	2,080,918	12–8	1–2½	9–8	1–1½	11	6	10 *13·5-in.*, 12 *6-in.*, 4 *3-pr.* 2 *3-in.* A.A.; 5 M.; 10 L.	4 (sub.)	21	3250 1050	1163
b.	**Malaya**¶ . 1936 *See p.* P25.	31,100	640¼	104	0	31	3	75,000 B. & W	Walker .	Wallsend . P.T.	1915	1916	¶	13–6	3–1	6	4–2	11	6	8 *15-in.*, 12 *6-in.*, 4 *4-in.* A.A., 4 *3-pr.*; 5 M.; 10 L.	4 (sub.)	25	— 3400	1136
b.	**Marlborough** † . 1934 *See p.* P26.	26,250	623	90	0	28	0	29,000 Y²	Devonport	Hawthorn P.T.	1912	1914	2,043,437	12–8	1–2½	9–8	1–1½	11	6	10 *13·5-in.*, 12 *6-in.*, 4 *3-pr.* 2 *3-in.* A.A.; 5 M.; 10 L.	4 (sub.)	21	3250 1050	1145

b.	**Nelson** . . 1942 *See p.* P23.	33,500	710	106 0	30 0	45,000	N'wc'stle-on-Tyne	Wallsend .	1925	1927	6,410,071*	..	..	..	..	..	..	9 *16-in.*, 12 *6-in.*, 6 *4·7-in.* A.A.; 4 *3-pr.*, 6 *2-pr.*	2	23	— 3750	1360
b.	**Queen Elizabeth** 1935 *See p.* P25.	31,100	644¾	‡104 0	31 3	75,000 B. & W.	Portsm'th	Wallsend . P.T.	1913	1915	2,943,000	13–6	3–1	6	4–2	11	6	8 *15-in.*, 12 *6-in.*, 4 *3-pr.*, 4 *4-in.* A.A.; 5 M.; 10 L.	4 (sub.)	25	— 3400	1187
b.	**Ramillies** . 1941 *See p.* P24.	29,150	620½	‡101 6	29 0	40,000 Y.	Dalmuir .	Beardmore, P.T.	1916	1917	3,295,800	13–6	4–1	6	6–4	11	6	8 *15-in.*, 12 *6-in.*, 4 *3-pr.*, 4 *4-in.* A.A.; 5 M.; 10 L.	4	23	— 3170	1010
b.	**Resolution** 1937 *See p.* P24.		620¼	‡101 4			Jarrow .	Palmer . P.T.	1915	1916	2,449,680											1012
b.	**Revenge** . 1937 *See p.* P24.		625¾	‡101 5			Barrow .	Vickers . P.T.	1915	1916	2,406,500											1104
b.	**Royal Oak** 1938 *See p.* P24.		620½	‡102 1			Devonp'rt	Hawthorn P.T.	1914	1916	2,468,269											1149
b.	**Royal Sovereign** 1936 *See p.* P24.		620¾	‡102 0			Portsm'th	Parsons . P.T.	1915	1916	2,570,929											1104
b.c.	**Renown** . 1940	32,000	794¼	102 4	25 6	112,000 B. & W.	Govan .	Fairfield . B.C.T.	1916	1916	3,111,284	6–3 K.C.	2	6–3	4–3	11–7 K.C.	6 K.C.	6 *15 in.*, 15 *4-in.*, 4 *3-pr.*, 4 *4-in* A.A.; 5 M.; 10 L.	2 (sub.) 8 a.w.	31·5	— 4250	1240
b.c.	**Repulse** . 1939 *See p.* P28.			102 6			Clydeb'nk	J. Brown . B.C.T.	1916	1916	2,760,062											
b.	**Rodney** . . 1942 *See p.* P23.	33,900	710	106 0	30 0	45,000	Birkenh'd	Cammell Laird	1925	1927	6,414,653*	..	..	..	..	..	..	9 *16-in.*, 12 *6-in.*, 6 *4·7-in.* A.A.; 4 *3-pr.*; 6 *2-pr.*	2	23	— 3750	1315

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* Total estimated cost of ship including guns.

† To be disposed of in accordance with London Naval Treaty.

‡ Over rubbers.

§ Retained as training ship in accordance with London Naval Treaty.

¶ Built at the charge of the Federated Malay States.

(*a*) Guns are in shields of 1-in. H.T. plating.

GREAT BRITAIN.—Armoured Ships—*continued.*

Class.	NAME. DATE FOR SCRAPPING.	Standard Displacement. (Washington Treaty.)	Length. (Extreme.)	Beam. (Extreme.)	Draught.	Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed	Fuel.	Complement (War).
												Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position.		Guns.	Torpedo Tubes.		Coal. Oil.	
																Heavy Guns.	Second-ary.					
		tons.	ft.	ft. ins.	ft. ins.						£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b.c.	**Tiger** § . . 1935 *See p.* P29.	28,900	702	90 6	28 6	108,000 B. & W.	Clydeb'nk	J. Brown . B.C.T.	1913	1914	2,088,000*	9–3	3–1	6	4–2	9	6	8 *13·5-in.*, 12 *6-in.*, 4 *3-pr.*, 4 *3-in.* A.A.; 5 M.; 10 L.	4 (sub.)	30	†2800 3480	1439
b.	**Valiant** . 1939 *See p.* P25.	31,100	639¾	104‡0	31 3	75,000 B. & W.	Govan .	Fairfield . B.C.T.	1914	1916	2,537,037*	13–6	3–1	6	4–2	11	6	8 *15-in.*, 12 *6-in*, 4 *3-pr.*, 4 *4-in.* A.A.; 5 M.; 10 L.	4 (sub.)	25	— 3400	1136
b.	**Warspite** . 1935 *See p.* P25.	31,100	641½	104‡0	31 3	75,000 B. & W.	Devonp'rt	Hawthorn P.T.	1913	1915	2,518,360*	13–6	3–1	6	4–2	11	6	8 *15-in.*, 12 *6-in.*, 4 *3-pr.*, 4 *4-in.* A.A.; 5 M.; 10 L.	4 (sub.)	25	— 3400	1130

* Total estimated cost of ship, including guns.
‡ Over rubbers.
† Total fuel carried not to exceed 4900 tons.
§ To be disposed of in accordance with London Naval Treaty.

The dates placed under the names of ships indicate the years in which they are to be scrapped according to the Washington Treaty.
Fleet target ship Centurion, converted from battleship.

GREAT BRITAIN.—Cruising Ships, &c.

Class.	NAME.	Standard Displacement. (Washington Treaty.)	Length. (Extreme.)	Beam. (Extreme.)	Draught.	Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Fuel.	Complement (War).
												Belt. Deck.	Gun Position	Guns.	Torpedo Tubes.		Coal. Oil.	
		tons.	ft.	ft. ins.	ft. ins.						£	in.	in.			knots.	tons.	
Cr.	Leander	..	..	..	..	..	Devonp'rt	Vickers Armstrongs	Bldg.	..	..	..	..		..	.	..	..
M.Cr.	Adventure *See p. P39.*	6,740	521	59 0	14 5	40,000	Devonp'rt	Vickers	1924	1927	1,258,503 *	..	..	4 *4·7-in* A.A., 4 *3-pr.*, 4 *2-pr.*, 2 M., 8 L.	..	27¾	— / 1550	395
A.C.	Argus	14,000	566	75 9	21 0	20,000	Dalmuir	Beardmore T.	1917	1918	..	..	..	6 *4-in.* A.A., 4 *3-pr.*, 4 M., 10 L	..	20¾	— / 2000	360
A.C.	Ark Royal	6,900	366	50 10	17 6	3000	Blyth	Blyth S. B. Co.	1914	1914	..	..	..	4 *12-pr.*, 4 M., 10 L.	..	11	— / 500	139
Cr.	Berwick	10,000	630	68 4	16 3	80,000	Govan	Fairfield	1926	1928	2,054,208 *	..	..	8 *8-in.*, 4 *4-in.* A.A. 4 *3-pr.*, 4 *2-pr.*, 4 M., 8 L.	8	32	— / 3200	685
Cr.	Cornwall	10,000					Devonp'rt	Beardmore	1926	1928	2,252,110 †	..	..					
Cr.	Cumberland *See p. P36.*	10,000					Barrow	Vickers	1926	1928	1,960,821 *	..	..					
A.C.	Courageous *See p. P30.*	22,500	786½	89 10	22 3	90,000 Y.	Walker (Armstr'g)	Parsons P.T.(G.)	1916	1928	1,785,940 (*a*) 2,115,944 (*b*)	3	9–7	16 *4·7-in.*, 4 *3-pr.*, 4 *2-pr.*, 4 M., 42 L.	..	31	— / 3250	750
A.C.	Glorious *See p. P30.*						Belfast	Harland & Wolff T.(G.)		1930	2,119,066 (*a*) 2,137,374 (*b*)	3	9–7					
P. L. Cr.	Carysfort	3895	446½	41 9	13 6	40,000	Pembroke	Hawthorn. B.C.T.	1914	1915	383,100	3 / —	..	4 *6-in.*, 2 *3-in.* A.A. 4 *3-pr.*, 2 *2-pr.* Pom Poms; 1 M.; 8 L.	4	29	— / 917	368
" "	Cleopatra *See p. P42.*						Devonport	Cammell Laird P.T.	1914	1915	440,000							
" "	Comus						Newcastle (Swan Hunter)	Wallsend Engn'g Co. P.T.	1914	1915	380,583							

* Total estimated cost of ship, including guns.

(*a*) First cost of ship as a cruiser,
(*b*) Estimated cost of reconstruction as aircraft carrier.

GREAT BRITAIN.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Standard Displacement. (Washington Treaty.)	Length. (Extreme.)	Beam. (Extreme.)	Draught.	Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour.			Armament.		Speed.	Fuel.		Complement (War).
												Belt.	Deck.	Gun Position.	Guns.	Torpedo Tubes.		Coal.	Oil.	
		tons.	ft.	ft. ins.	ft. ins.						£	in.		in.			knots.	tons.		
P. L. Cr.	Cairo	4200	451¾	43 10	14	1 40,000	Birkenhead	Cammell Laird T.(G.)	1918	1919	794,529	3	—	..	5 *6-in.*, 2 *3-in* A.A., 4 *3-pr.*; 2 *2-pr.* Pom Poms; 2 M.; 8 L.	8	29	—	950	415
” ”	Calcutta						Barrow	Vickers T.(G.)	1918	1919	851,988									
” ”	Capetown						Birkenhead	Cammell Laird T.(G.)	1919	1922	1,002,674									
” ”	Carlisle						Govan	Fairfield T.(G.)	1918	1918	669,216									
” ”	Colombo *See p.* P41.						Govan	Fairfield T.(G.)	1918	1919	692,308									
” ”	Caledon	4180	450	43 1	14	1 40,000	Birkenhead	Cammell Laird T.(G.)	1916	1917	547,300	3	—	..	5 *6-in.*, 2 *3-in.* A.A., 4 *3-pr.*; 2 *2-pr.* Pom Poms; 2 M.; 8 L.	8	29	—	935	420
” ”	Calypso						Newcastle (Hawth'n)	Hawthorn Leslie T.(G.)	1917		529,190									
” ”	Caradoc *See p.* P41.						Green'ck	Scotts' T.(G.)	1916		534,583									
” ”	Calliope	3920	446½	41 9	13	6 40,000	Chath'm	Parsons P.T.(G.)	1914	1915	414,350	3	—	..	4 *6-in.*, 2 *3-in.* A.A., 4 *3-pr.*, 2 *2-pr.*, Pom Poms; 1 M.; 8 L. [Champion 1 *3-in.* A.A.]	2 sub.	29	—	841	368
” ”	Champion						Newcastle (Hawthorn)	Hawthorn P.T.(G.)	1915	1915	409,609									
” ”	Cambrian						Pembroke	Cammell Laird T.	1916	1916	493,518									
” ”	Canterbury						Clydebank	J. Brown T.	1915	1916	300,000†									
” ”	Castor						Birkenhead	Cammell Laird T.	1915	1915	358,300									
” ”	Constance *See p.* P42.						Birkenhead	Cammell Laird T.	1915	1916	374,270									

P. L. Cr.	**Cardiff**	4290	450	43	9	14	1	40,000	Govan	Fairfield T. (G.)	1917	1917	542,507	3/—	..	5 *6-in.*, 2 *3-in.* A.A., 4 *3-pr.*, 2 *2-pr.* Pom Poms; 2 M.; 8 L. [Cardiff, Ceres 2 *3-pr.*]	8	29	—/950	430
,, ,,	**Ceres**								Clydebank	J. Brown T. (G.)	1917	1917	529,218							
,, ,,	**Coventry**								Newcastle (Swan Hunter)	Swan Hunter T. (G.)	1917	1918	586,182							
,, ,,	**Curacoa**								Pembroke	Harland & Wolff T. (G.)	1917	1918	794,201							
,, ,,	**Curlew** *See p.* P41.								Barrow	Vickers P.T. (G.)	1917	1917	544,436							
,, ,,	**Centaur**	4120	446⅓	42	3	13	6	40,000	Elswick	Vickers T.	1916	1916	300,000†	3/—	..	4 *6-in.*, 2 *3-in.* A.A., 2 *3-pr.*, 2 *2-pr.* Pom Poms; 2 M.; 8 L.	2 sub.	29	—/820	437
,, ,,	**Concord** *See p.* P41.								Elswick	Vickers T.										
P. L. Cr.	**Despatch**	4850	472¾	46	9	14	3	40,000	Govan	Fairfield T. (G.)	1919	1922	1,014,178	3/—	Shields	6 *6-in.*, 3 *4-in.* A.A., 2 M., 4 *3-pr.*, 8 L., 2 *2-pr.* Pom Poms.	12	29	—/1050	460
,, ,,	**Danae**								Elswick	Armstrong T. (G.)	1918	1918	701,600							
,, ,,	**Dauntless**								Jarrow	Palmer T. (G.)	1918	1918	750,025							
,, ,,	**Dragon** *See p.* P40.								Green'ck	Scotts' T. (G.)	1917	1918	690,083							
P. L. Cr.	**Delhi**	4850	472¾	46	9	14	3	40,000	Elswick	Armstrong T. (G.)	1918	1919	785,145	3/—	Shields	6 *6-in.*, 3 *4-in.* A.A., 4 *3-pr.*, 2 *2-pr.* Pom Poms; 2 M.; 8 L.	12	29	—/1050	460
,, ,,	**Durban** *See p.* P40.								Green'ck	Scott T. (G.)	1919	1921	994,302							
Cr.	**Devonshire** *See p.* P34.	10,000	630	66	0	17	0	80,000	Devonp'rt	Vickers P.T.	1927	1929	2,007,275	..	..	8 *8-in.*, 4 *4-in.* A.A., 4 *3-pr.*, 4 *2-pr.*, 4 M., 8 L.	8	32¼	—/3200	685
Cr.	**Dorsetshire** *See p.* P34.	10,000	633	66	0	17	0	80,000	Portsmouth	Cammell Laird	1929	1930	..	..	..	8 *8-in.*, 4 *4-in.* A.A., 4 *3-pr.*, 4 *2-pr.*, 4 M., 8 L.	8	32¼	—/3200	685
A.C.	**Eagle**, *ex*-Almirante Cochrane. *See p.* P32.	22,600	667½	105	2	21	11	50,000	Walker	J. Brown T.	1918	1924	3,310,042	..	..	9 *6-in.*, 5 *4-in.* A.A., 4 *3-pr.*, 4 M., 10 L.	..	24	—/3750	746

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* Total estimated cost of ship, including guns.

† Estimated cost as originally designed.

GREAT BRITAIN.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Standard Displacement. (Washington Treaty.)	Length. (Extreme.)	Beam. (Extreme.)		Draught.		Horse Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt. / Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Fuel. Coal. / Oil.	Compl-ment (War).
		tons.	ft.	ft.	ins.	ft.	ins.						£	in.	in.			knots.	tons.	
A.C.	**Furious** *See p.* P31.	22,450	786½	90	1	21	6	90,000	Walker (Armstrong)	Wallsend Engn'g Co. T. (G.)	1916	1917	1,920,000†	3 —	7	10 5·5-*in.*, 6 4-*in.* A.A., 4 3-*pr.*, 4 2-*pr.*, 4 M., 10 L.	..	31	— 4025	710
P. L. Cr.	**Effingham**	9770	605	65	1	17	3	65,000	Portsmouth	Harland & Wolff. T.	1921	1925	2,138,999	3 —	Shields	7 7·5-*in.*, 3 4-*in.* A.A., 4 3-*pr.*; 2 M.; 8 L. [Frobisher, 4 4-*in.* A.A.]	5 (1 sub.)	30·5	— 2150	713
P. L. Cr.	**Frobisher** *See p.* P38.	9860							Devonport	Wallsend Eng. Co. T.	1920	1924	2,035,915†				6 (2 sub.)	30·5		715
P. L. Cr.	**Enterprise**	7550	570	54	9	16	6	80,000	Clydebank	John Brown T. (G.)	1919	1926	1,690,658*	3-1½ 1	..	7 6-*in.*, 3 4-*in.* A.A., 4 3-*pr.*, 2 2-*pr.* Pom Poms; 2 M.; 8 L.	16	33	— 1700	577
P. L. Cr.	**Emerald** *See p.* P37.			54	7				Elswick	Armstrong T. (G.)	1920	1926	1,474,235*							
Cr.	**Exeter** *See p.* P35.	8,400	575	58	0	17	0	80,000	Devonp'rt	Parsons	1929	Bldg.	..	..	..	6 8-*in.*, 4 4-*in.* A.A., 4 3-*pr.*, 2 2-*pr.*, 4 M., 8 L.	6	32¼	— 1900	..
P. L. Cr.	**Hawkins** *See p.* P38.	9,800	605	65	1	17	3	60,000	Chatham	Parsons Co. T. (G.)	1917	1919	1,599,741	3 —	Shields	7 7·5-*in.*, 4 4-*in.* A.A., 4 3-*pr.*, 2 2-*pr.* Pom Poms; 2 M., 8 L.	6 (2 sub.)	30	800 1420	747
A.C.	**Hermes** *See p.* P33.	10,850	599½	‡70	3	18	7	40,000	Elswick	Parsons Co. T. (G.)	1919	1924	2,030,263*	..	..	6 5·5-*in.*, 3 4-*in.* A.A. 4 3-*pr.*, 2 2-*pr.* Pom Poms; 4 M., 10 L.	..	25	— 2000	531
Cr.	**Kent** *See p.* P36.	10,000	630	68	4	16	8	80,000	Chatham	Hawthorn Leslie	1926	1928	2,128,950†	..	..	8 8-*in.*, 4 4-*in.* A.A., 4 3-*pr.*, 4 2-*pr.*, 4 M., 8 L.	8	32	— 3200	685
Cr.	**London** *See p.* P34.	10,000	630	66	0	17	0	80,000	Portsmouth	Fairfield P T.	1927	1929	2,029,949*	..	..		8	32¼	— 3200	685

Cr. . .	**Norfolk** *See p.* P34.	10,000	633	66	0	17	0	80,000	Fairfield	Fairfield .	1928	1930	..	..	..	8 *8-in.*, 4 *4-in.* A.A., 4 *3-pr*, 4 *2-pr.*, 4 M., 8 L.	8	32¼	— 3200	685
Cr. . .	**Shropshire** . *See p.* P34.	10,000	633	66	0	17	0	80,000	Dalmuir .	Beardmore	1928	1929	1,941,950†	..	..	8 *8-in.*, 4 *4-in.* A.A., 4 *3-pr.*, 4 *2-pr.*, 4 M., 8 L.	8	32¼	— 3200	685
Cr. .	**Sussex** *See p.* P34.	10,000	630	66	0	17	0	80,000	Hawthorn Leslie .	Hawthorn Leslie .	1928	1929	1,975,800†	..	..					
Cr. . .	**Suffolk** . *See p.* P36.	10,000	630	68	4	16	3	80,000	Ports-mouth	Parsons	1926	1928	2,180,240†	..	..		8	22	— 3200	685
P. L. Cr. .	**Vindictive** . *See p.* P38.	9,996	605	65	1	17	3	60,000	Belfast	Harland & Wolff. T. (G.)	1918	1918	1,671,712	3 —	Shields	7 *7·5-in.*, 3 *4-in.* A.A., 4 *3-pr.*, 2 *2-pr.* Pom Poms; 2 M., 8 L.	6 (2 sub.)	30	800 1420	720
Cr. . .	**York** . . *See p.* P35.	8,400	575	57	0	17	0	80,000 (G.)	Palmers'	Palmers' .	1928	1930	..	..	..	6 *8-in.*, 4 *4-in.* A.A., 4 *3-pr.*, 2 *2-pr.*, 4 M., 8 L.	6	32¼	— 1900	..

* Total estimated cost of ship, including guns. † Estimated cost, excluding armament and ordnance stores. ‡ Extreme breadth under water; 100 ft. over seaplane lifting rails.

Three "Leander" Class cruisers are authorised: Orion to be built at Devonport, Neptune at Portsmouth, and Achilles at a private shipyard.

Patrol Boats.—P.C. 74, Dart (1918), 610 tons, 20 knots, 1 4-in., 2 12-pr.; P.59 (1917), P.40 (1916), Spey (1917), 560 tons, 20 knots, 1 4-in., 1 2-pr.

Training Ships.—Erebus, 7,200 tons; Terror, 7,200 tons; Marshal Soult, 6,400 tons.

Fishery Protection Gunboats (ex-trawlers).—Colne, Doon, Dee, Garry, Kennet, Liffey, 490-550 tons.

Destroyer Depôt Ships.—Greenwich, Sandhurst.

Submarine Depôt Ships.—Lucia, Vulcan, Titania, Alecto, Adamant, Dolphin, Cyclops. Medway, built at Vickers', completed 1929, displacement 15,000 tons, speed 15 knots, armament 2 4-in., 4 4-in. A.A. One more was authorised for commencement under the 1928-29 Estimates, the Maidstone, but construction was cancelled 24/7/1929.

Repair Ships.—Assistance. Resource, built at Messrs. Vickers; completed 1930, displacement 13,500 tons, speed 15 knots, armament 4 4-in. A.A.

Minelayers.—Medea, Medusa, Melpomene, Minerva, Vernon, Kate Lewis.

Surveying Vessels.—Beaufort, Fitzroy, Flinders, Kellett, Herald, Ormonde, Iroquois, Endeavour.

Netlaying Vessel.—One netlayer, named Guardian, to be commenced at Chatham in 1931.

Mining School Tender.—Nightingale building at Portsmouth, displacement 255 tons, horse-power 400 speed 10 knots, coal capacity 15 tons.

Research Ship.—Challenger, building at Chatham.

Defence Forces of the Dominions.

ROYAL AUSTRALIAN NAVY.

Class.	NAME.	Standard Displacement. (Washington Treaty.)	Length. (Extreme.)	Beam. (Extreme.)		Draught.		Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal. / Oil	Complement (War).
														Belt. / Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	in.	ft.	in.						£	in.	in.			knots	tons.	
Cr.	**Australia**	10,000	630	68	4	16	3	80,000	Brown	Brown	1927	1928	..	..	..	8 *8-in.*, 4 *4-in.* A.A., 4 *3-pr.*, 4 *2-pr.* 4 M., 8 L.	8	32	— / 3400	**685**
”	**Canberra** *See p.* P36.								Clyde-bank											
L. Cr.	**Adelaide**	5100	462½	50	1	15	10	25,000	Sydney	Sydney	1918	1922	..	..	..	9 *6-in.*, 4 *3-pr.*, 2 M., 1 *3-in.* A.A., 8 L.	2 (sub.)	25	951 / 558	**450**
L. Cr.	**Brisbane**	5120	457	49	10	15	9	25,000	Sydney	Vickers T.	1915	1916	..	3 / —	..	8 *6-in.*, 4 *3-pr.*, 2 M., 1 *3-in.* A.A., 8 L.	2 (sub.)	25·5	1196 / 260	**490**
Seaplane Carrier	**Albatross**	5000	443¾	61	0	15	6	12,000	Cockatoo Island	—	1928	1929	—	—	—	4 *4·7-in.* A.A., 4 *2-pr.* Pom Pom, 4 *3-pr.* 4 M., 10 L.	—	21	— / 1000	**350**
Flot. Ldr.	**Anzac**	1310	327½	31	10	11	1	36,000	Dumbar-ton	Denny T.	1917	1917	—	—	—	4 *4-in.* Q.F., 2 *2-pr.* A.A. 1 M., 4 L.	4	34	515 Oil	**146**

DESTROYERS.—“*S*” *Class* :—Stalwart, Success, Swordsman, Tasmania, Tattoo. Completed, 1919; Displacement, 905 tons; 27,000 H.P.; speed, 36 knots; armament, three 4-in., one 2-pdr., 2 double torpedo tubes.

SUBMARINES.—Oxley and Otway, built by Messrs. Vickers, completed 1927, displacement $\frac{1400}{1835}$ tons, 15½ knots surface, 9 knots submerged; armament, one 4-in., one smaller gun; eight torpedo tubes.

SLOOPS.—“*Flower*” *Class* :—Marguerite, Geranium (1916), 1,175 tons; speed, 16·5 knots; armament, 1 *4*-in., 2 *3*-pr.; Mallow (1915), 1,165 tons, 1 *12*-pr., 1 *3*-pr. A.A.
Surveying vessel Moresby (late Silvio) 1650 tons, length 267½ ft., 2,500 H.P., 17 knots, one 3-pr.
Submarine depôt and fleet repair ship: Penguin (late Platypus). Displacement 3,450 tons; completed 1917.

NEW ZEALAND NAVY.

Light Cruisers—"*D*" *Class*:—Dunedin [p. P40]; completed, 1919 (Elswick). Diomede [p. P40]; completed 1922 (Vickers). Displacement, 4,850 tons; 40,000 H.P.; speed, 29 knots; armament, 6 6-in., 3 4-in. A.A., 4 3-pr., 2 2-pr. Pom Poms, 2 M., 4 triple torpedo tubes; max. fuel, 1,050 tons oil; complement, 450.

ROYAL CANADIAN NAVY.

Destroyers.—Champlain and Vancouver. Completed, 1919 (Thornycroft). Displacement, 905 tons; 29,000 H.P.; speed, 36 knots; armament, 3 4-in., 1 2-pr., 4 21-in. tubes; oil, 305 tons (radius of action, 2,000 at 15 knots). Saguenay and Skeena building at Thornycroft's; displacement 1330 tons; speed, 35 knots; armament, 4 4·7-in., 2 2-pr., 2 quad. torpedo tubes.

SOUTH AFRICA.

Surveying Ship.—"*Beaufort*" *Class*:—Protea (ex-Crozier). Twin-screw mine-sweeper, converted 1919. Displacement, 710 tons; 2,200 H.P.; speed, 16 knots; coal capacity, 185 tons; armament, one 3-pr. Transferred to South Africa, September, 1921.

ROYAL INDIAN MARINE.

Minesweeping Sloops.—Clive, 2,021 tons; 1,700 H.P.; 2 4-in., 2 12-pdr., 4 3-pdr. guns; launched Beardmore, 1919. Lawrence, 1,259 tons; 1,900 H.P.; 2 4-in., 2 12-pdr., 4 3-pdr. guns; launched Beardmore, 1919. Hindustan, building, Swan Hunter. Displacement 1,170 tons; speed 16 knots; 2 4-in. guns.

Sloop.—Cornwallis, 1,290 tons; 2,500 H.P.; 3 4-in., 2 12-pdr., 4 3-pdr. guns (launched Hamilton, 1917, as the Lychnis).

Surveying Ships.—Investigator, 1,172 tons; 1,550 H.P.; no guns. Palinurus, 444 tons; 475 H.P.; no guns. Both completed 1907.

Patrol Boats.—Baluchi, 682 tons; Pathan, 695 tons; both 3,500 H.P., and 1 4-in. and 2 12-pdr. guns; completed, 1917 and 1918.

ARGENTINE REPUBLIC.

Class.	NAME.	Displacement.	Length. (Extreme).	Beam.	Draught.	Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Fuel. Coal. Oil.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Second-ary.	Guns	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
c. c. c.	Almirante Brown **Vintecinco de Maio** **1 vessel** *See p.* P44.	6495	545¾	58	15¼	85,000	Leghorn Genoa Projected	1929	..	1,250,000	..	..	..	..	..	..	6 *7·5-in.*, 12 *4-in.* A.A., 6 Pom Poms	6	32	— 2000	600
a.c.	**Garibaldi** *	6840	328	59¾	24	13,384	Sestri Ponente	1895	1896	752,000	6–3 H.S.	1½	6 H.S.	6 H.S.	6 H.S.	6 H.S.	2 *10-in.*, 10 *6-in.*, 6 *4·7-in.*, 2 *3-in.*, 4 *6-pr.*	..	19·9 *t*	1137 —	414
a.c.	**General Belgrano** †	6840	328	59¾	24	13,000	Leghorn	1897	1899	696,700	6–3 H.S.	1½	6 H.S.	6 H.S.	6 H.S.	6 H.S.	1 *10-in.*, 8 *6-in.*, 4 *3-in.*, 4 *6-pr.*	..	20·1 *t*	..	515
a.c.	**General San Martin** †	6773	328	59¾	24	13,000	Leghorn	1896	1898	688,200	6–3 H.S.	1½	6 H S.	6 H.S.	6 H.S.	6 H.S.	1 *8-in.*, 8 *6-in.*, 6 *4·7-in.*	..	19·8	..	431
b.	Moreno Rivadavia *See p.* P43.	27940	585	95½	28	45,000	Camden, N.J. (N.Y.S.B.Co.) Quincy, Mass.	1911	1915 1914	2,200,000	12–10 K.S.	3–2	9–6 K.S.	9 K.S.	12–9 K.S.	6 K.S.	12 *12-in.*, 12 *6-in.*, 4 *3-in.* A.A., 4 *3-pr.*; 6 M., 4 L.	4 (sub.)	22·5	— 4200	1046
a.c.	Pueyrredon †	6840	328	59¾	24	13,000 B.	Sestri Ponente	1898	1901	782,000	6–3 H.S.	1½	6 H.S.	5 H.S.	6 H.S.	6 H.S.	1 *10-in.*, 8 *6-in.*, 2 *3-in.* A.A.	..	20·1 *t*	..	430

Moreno and Rivadavia were converted to oil burning and fitted with geared turbines in 1925.

The old coast-defence ironclads Libertad and Independencia, 2300 tons, completed at Birkenhead in 1892–93, carry two 9·4-in., four 4·7-in., and six 3-pr. guns. The Libertad is unserviceable at present, but is being refitted.

Cruiser Buenos Aires (Elswick, 1895), 4780 tons, four 6-in., six 4·7-in., twelve 3-prs., 23·2 knots on trial. River gunboats Paraná and Rosario (Elswick, 1909), 1055 tons, two 6-in. howitzers, six 12-pr., 8 M., 2 L., 15 knots. For destroyers, see Flotilla Tables.

The training-ship (cruiser) Presidente Sarmiento, 2750 tons, 15 knots; two 4·7-in., two 4-in., four 6-pr., two 3-pr., also the old cruiser Nueve de Julio (aviation training ship), 3570 tons, Elswick 1902, of no military value. There are 13 transports and many auxiliaries.

Two sloops, San Juan and San Luis, built in England at Hawthorn & Leslie's, Newcastle, 790 tons, 12 knots, for survey purposes. Completed 1928, carry one 3-in.

Two tugs, Mataco, Toba completed 1928, at Messrs. Hawthorn & Leslie's, Newcastle.

* Training ship.

† Converted to oil burning and armament altered in 1929.

BRAZIL.

Class.	NAME.	Displacement.	Length. (Extreme).	Beam.	Draught.	Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.				Gun Position.		Armament.		Speed.	Coal Oil.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkheads.	Heavy Guns.	Second-ary.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
c.d.s., t.	**Marshal Floriano**	3162	267½ p.p.	48	13¼	3400 D'A.	La Seyne	1899	1901	..	13¾–4 H.S.	1½	..	..	8 H.S.	3 H.S.	2 *9·4-in.*, 4 *4·7-in.*, 2 M., 4 *6-pr.*, 2 *1-pr.*	2 (sub.)	15·0	236 —	260
b.	**Minas Geraes** *See p.* P45.	19,281	543	83	25	27,212 *t* B.&W.	Elswick	1908	1909	1,821,400	9–6–4 K.S.	2	9–6–4 K.S.	9	12–8 K.S.	9 K.S.	12 *12-in.*, 22 *4·7-in.*, 8 *3-pr.*, 2 *3-in.* A.A.; 4 M.	—	21·5 *t*	2360 350	850
b.	**São Paulo** *See p.* P45.	19,281	543	83	25	28,645 *t* B.&W.	Barrow	1909	1910	1,821,400	9–6–4 K.S.	2	9–6–4 K.S.	9 K.S.	12–8 K.S.	9 K.S.	12 *12-in.*, 22 *4·7-in.*, 8 *3-pr.*, 2 *3-in.* A.A.; 4 M.	—	21·5 *t*	2360 350	850

LIGHT CRUISERS:—Bahia and Rio Grande do Sul, completed at Elswick, 1910, reconstructed at Rio de Janeiro, 1926, 3100 tons, ten 4·7-in., four 3-pr. guns, 2 twin torpedo tubes, 20,000 H.P., 27 knots; Barroso (Elswick, 1897), 3600 tons, six 6-in., four 4·7-in., four 6-pr., 8 M., 2 L. guns, 20 knots. Two 11-knot river gunboats, Missões, Oyapock.

MINELAYERS:—Maria do Couto, Carneiro da Cunha, Heitor Perdigao and Muniz Freire.

Also river monitors Espirito Santo (*ex* Maranhao) and Pernambuco, built at Rio de Janeiro. The Espirito Santo is being converted into a gunboat scout at Rio de Janeiro.

SUBMARINE TENDER:—Ceará (Spezia, 1916), 4000 tons, 4100 H.P., 14 knots, four 4-in. guns and two smaller.

CHILE.—Armoured Ships.

Class.	NAME.	Displacement.	Length. (Extreme.)	Beam.	Draught.	Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Fuel.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Second-ary.	Guns.	Torpedo Tubes.		Coal. Oil.	
		tons.	ft.	ft. ins.	ft. ins.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b.	**Almirante Latorre** * (*ex* Canada) *See p. 46.*	28,000	661	92 6	29 0	37,000 P. tur. Y 2	Elswick	1913	1915	..	9–4 A.I.	4–2½	4½	..	10	6	10 *14-in.*, 14 *6-in.*, 2 *3-in.*, A.A., 4 *3-pr.*	4 (sub.)	23	3300 520	1000
a.c.	**O'Higgins**	8,500	412 p.p.	62 9	22 0	16,000 B.	Elswick	1897	1898	..	7–5	2	..	..	7½–6	6	4 *8-in.*, 10 *6-in.*, 12 *3-in.*, 4 M.	2 (sub.)	21·5 *t*	1200 —	500
b.	**Capitan Prat** †	6,900	328 p.p.	60 9	22 9	12,000	La Seyne	1890	1893	391,000	12	3	4	..	10½	2	4 *9·4-in.* (Canet), 8 *4·7-in.* (Canet), 8 *6-pr.*, 11 M.	2	18·3 *t*	775 —	500
a.c.	**Esmeralda** ‡	7,020	436 p.p.	53 2	20 3	18,000	Elswick	1896	1897	..	6 H.S.	2	..	6 H.S.	4½ Shields	..	2 *8-in.*, 12 *6-in.*, 12 *3-in.*, 2 L.	2 (sub.)	22·8 *t*	1350 —	500

* Being fitted with bulges and modernized in England. † Submarine parent ship. ‡ Of little fighting value.

Cruising Ships, &c.

Class	NAME.	Displacement.	Length. (Extreme.)	Beam.	Draught.	Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft. ins.	ft. ins.						in.	in.			knots.	tons.	
cr.	**Blanco Encalada**	4400	370 p.p.	46 6	19 6	14,500	Elswick	1893	1894	..	4–1¾	..	2 *8-in.*, 8 *6-in.*, 4 *3-in.*	2	22·78 *t*	850 —	385
,,	**Chacabuco**	4500	360 p.p.	46 6	17 0	15,500	Elswick	1901	1903	..	4½–1¾	..	2 *6-in.*, 10 *4·7-in.*, 4 *3-in.*	2 (sub.)	24·0	1000 —	400
,,	**Ministro Zenteno**	3420	330¼ p.p.	43 9	16 9	6500	Elswick	1896	1898	..	..	..	8 *6-in.*, 4 *3-in.*, 8 M.	2	20·0	840 —	300

Transports: Maipo, 4,686 tons gross; Rancagua, 6,210 tons gross. Coastguard vessels: Orompello, Leucoton, Elicura, Colocolo, 500 tons; Aguila, 820 tons; Porvenir, 450 tons. Submarine depôt ship: 1 built at Vickers-Armstrongs, Barrow, the Araucano, completed 1930; displacement 6,500 tons; armament two 4·7-in.; length b.p. 390 ft.; beam 55 ft.; draught 16 ft. 6 ins.; speed 13 knots; H.P. 2,500. **Two cruisers are projected.**

DENMARK.—Armoured Ships.

Class.	NAME.	Displacement.	Length. (Extreme.)		Beam.		Draught.		Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Fuel.		Complement.
														Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Second-ary.	Guns.	Torpedo Tubes.		Coal.	Oil.	
		tons.	ft.	ins.	ft.	ins.	ft.	ins.					£	in.	in.	in.	in.	in.	in.			knots.	tons.		
c.d.s.,t.	**Herluf Trolle** .	3595	283	9	49	6	16	6	4400 *t*	Copenhagen	1899	1901	..	7–4 H.S.	3	..	..	7 H.S.	6 H.S.	2 *9·4-in.*, 4 *5·9-in.*, 6 *3-in.*, 2 *6-pr.* A.A., 2 M.	3 (sub.)	16·0	250	—	256
c.d.s.,t.	**Niels Juel** .	4100	295	4	53	6	15	9	5500	Copenhagen	1918	1923	..	8–4 K.S.	2	..		..	2 K.S.	10 *5·9-in.*, 2 *6-pr.*, 2 *3-in.* A.A.	2 (sub.)	17·0	240	250	309
c.d.s.,t.	**Olfert Fischer** .	3650	283	9	50	6	16	9	4600 *t*	Copenhagen	1903	1905	..	7–4 K.S.	3	..	..	7 K.S.	6	2 *9·4-in.*, 4 *5·9-in.*, 6 *3-in.*, 2 *6-pr.* A.A., 2 *1-pr.*, 2 M.	3 (sub.)	16·0	250	—	256
c.d.s.,t.	**Peder Skram** .	3735	286	7	51	6	16	3	5400	Copenhagen	1908	1909	..	8–4 K.S.	2	..	..	7 K.S.	6 K.S.	2 *9·4-in.*, 4 *5·9-in.*, 8 *3-in.*, 2 *1-pr.*, 2 *3-in.* A.A., 2 M.	4 (sub.)	16·0	250	—	262

Cruising Ships, &c.

Class.	NAME.	Displacement.	Length. (Extreme.)		Beam.	Draught.	Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
												Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ins.	ft.	ft.					£	in.	in.				tons.	
3rd cl. *cr.*	**Hejmdal** * . .	1289	237	1	34	11¾	3100 *t*	Copenhagen .	1894	1896	..	1½	..	2 *4·7-in.*, 4 *20-pr.*, 2 *6-pr.*, 2 *6-pr.* A.A., 2 M.	2	17·0	150	143

Mine-layers Lossen, Minekran IV–VI, Mining boats 1–10. Fylla (ex-British sloop Asphodel), and 5 other fishery inspection vessels. Groensund, torpedo boat repair ship; Hekla, submarine depôt ship. Submarine depôt and repair ship Henrik Gerner completed 1928, displacement 490 tons, 900 H.P., 13 knots, carries two 3-in. guns. **Fishery inspection vessel Aegir building for Iceland Government.**

*** Now in reserve, to be sold shortly.**

FRANCE.—Armoured Ships.

Class.	NAME. DATE FOR SCRAPPING.	Displacement.	Length. (Extreme.)		Beam.		Draught.		Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Fuel. Coal. / Oil.	Complement.
														Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Second-ary.	Guns	Torpedo Tubes.			
		tons.	ft.	ins.	ft.	ins.	ft.	ins.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b.	**Bretagne** . . 1934 *See p.* P47.	23,128*	544	6	88	6	29	0	29,000 N. tur.	Brest .	1913	1915	2,589,439	11–7 K.S.	2¾–1¾	7 K.S.	7 K.S.	10½ K.S.	7 K.S.	10 *13·4-in.*, 18 *5·5-in.*, 4 *3-in.* A.A., 5 *3-pr.*, 2 *1-pr.*, 2 L.	4 (sub.)	20·0	2700 300	1167
b.	**Condorcet.** . *See p.* P49.	18,592*	480	11	84	7	27	0	22,500 N. tur.	St. Nazaire	1909	1911	2,165,200	10–8 K.S.	2¾	8¾	..	12 K.S.	8¾ K.S.	4 *12-in.*, 12 *9·4-in.*, 12 *3-in.*, 4 *3-pr.* A.A., 2 *1-pr.*, 2 L.	2 (sub.)	19·25	2100 —	890
b.	**Courbet** . . 1930 *See p.* P48.	23,128*	544	6	88	6	29	0	28,000 N. tur.	Lorient .	1911	1913	2,508,388	11–7 K.S.	2¾–1¾	7 K.S.	7 K.S.	10½ K.S.	7 K.S.	12 *12-in.*, 22 *5·5-in.*, 3 *3-pr.*, 4 *3-in.* A.A., 2 *1-pr.*, 2 L.	4 (sub.)	20·0	2450 250	1140
b.	**Diderot** . . *See p.* P49.	18,592*	480	11	84	7	27	0	22,500 N. tur.	St. Nazaire	1909	1911	2,167,000	10–8 K.S.	2¾	8¾	..	12 K.S.	8¾	4 *12-in.*, 12 *9·4-in.*, 12 *3-in.*, 4 *3-pr.* A.A., 2 *1-pr.*, 2 L.	2 (sub.)	19·25	2100 —	890
a.c.	**Ernest Renan** . *See p.* P50.	13,500*	521	7	70	0	27	6	37,500 Nic., *t*	St. Nazaire	1906	1909	1,410,000	6¾–4 H.S.	2	5–3 H.S.	4¾	6 H.S.	5 H.S.	4 *7·6-in.*, 12 *6·5-in.*, 6 *3-in.* A.A., 8 *9-pr.*, 2 *1-pr.*	2 (sub.)	24·4 *t*	1870 —	874
b.	**Jean Bart** . 1930 *See p.* P48.	23,128*	544	6	88	6	29	0	28,000 B. tur.	Brest .	1911	1913	2,528,888	11–7 K.S.	2¾–1¾	7 K.S.	7 K.S.	10½ K.S.	7 K.S.	12 *12-in.*, 22 *5·5-in* , 4 *3-pr.*, 4 *3-in.* A.A., 2 *1-pr.*, 2 L.	4 (sub.)	20·0	2450 250	1140
a.c.	**Jules Michelet.** *See p.* P50.	12,400*	489	0	70	3	27	0	29,000 Guyot	Lorient .	1905	1908	1,204,107	6–4 K.S.	2	5–3 K.S.	6 H.S.	8 K.S.	5 K.S.	4 *7·6-in.*, 12 *6·5-in.*. 2 *3-in.* A.A., 10 *3-pr.*, 2 M.	2 (sub.)	22·0	1870 —	724

b.	**Lorraine** . 1936 *See p.* P47.	. 23,128*	544	6	88	6	29	0	29,000 tur. S. & cyl.	St. Nazaire	1913	1916	2,642,439	11–7 K.S.	2¾–1¾	7 K.S.	7 K.S.	10½ K.S.	7 K.S.	10 *13·4-in.*, 18 *5·5-in.*, 4 *3-in.* A.A., 5 *3-pr.*, 2 *1-pr.*, 2 L.	4 (sub.)	20·0	..	1167
b.	**Paris** . . 1934 *See p.* P48.	. 23,128*	544	6	88	6	29	0	28,000 N. tur.	La Seyne .	1912	1914	2,603,920	11–7 K.S.	2¾–1¾	7 K.S.	7 K.S.	10½ K.S.	7 K.S.	12 *12-in.*, 22 *5·5-in.*, 4 *3-pr.*, 4 *3-in.* A.A., 2 *1-pr.*, 2 L.	4 (sub.)	20·0	2450 250	1140
b.	**Provence** . 1935 *See p.* P47.	. 23,128*	544	6	88	6	29	0	29,000 tur.	Lorient .	1913	1915	2,589,000	11–7 K.S.	2¾–1¾	7 K.S.	7 K.S.	10½ K.S.	7 K.S.	10 *13·4-in.*, 18 *5·5-in.*, 4 *3-in.* A.A., 5 *3pr.*, 2 *1-pr.*, 2 L.	4 (sub.)	20·0	2700 300	1167
b.	**Voltaire** . *See p.* P19.	. 18,592*	480	11	84	7	27	0	22,500 B. tur.	La Seyne .	1909	1911	2,169,200	10–8 K.S.	2¾	8¾	..	12 K.S.	8¾ K.S.	4 *12-in.*, 12 *9·4-in.*, 12 *3-in.*, 4 *3-pr.* A.A., 2 *1-pr.*, 2 L.	2 (sub.)	19·25	2100 —	890
a.c.	**Waldeck-Rousseau** *See p.* P51.	. 13,828*	521	4	70	7	27	6	35,286 Nic. *t.*	Lorient .	1908	1911	1,301,380	6½–3½	2½	5	4¾	6	5½	14 *7·6-in.*, 10 *3-in*, 10 *9-pr.* A.A., 2 *3-pr.*, 2 M.	2 (sub.)	23·0 *t*	1900 —	874

* Standard Displacement (Washington Treaty).

Lorraine refitted and converted to oil burning 1929. The armoured cruisers Condé, Gueydon (1903-4) are retained temporarily as Training Ships. Paris completed reconstruction 1929.

FRANCE.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length. (Extreme.)		Beam.		Draught.		Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Fuel.	Complement.
														Belt.	Gun Position.	Guns.	Torpedo Tubes.		Coal / Oil	
		tons.	ft.	ins.	ft.	ins.	ft.	ins.					£	in.	in.			knots.	tons.	
training cruiser	**Jeanne d'Arc** . *See p.* P54.	6,500	557	8	58	0	18	8	32,000	Penhoet Yard, St. Nazaire	1930	Bldg.	..	..	..	8 *6·1-in.*, 4 *3-in.* A.A., 2 *1·6-in.*, 2 M., 2 seaplanes	2 triple	26·5	..	..
cr.	**L'Algérie** . .	10,000	..		..		..		..	Brest . .	Bldg.	Bldg.	..	..	..	8 *8-in.*, 8 *3·5-in.* A.A., 8 *1·5-in.*	6	32	..	..
,, .	**Dupleix** . .	10,000*	607	0	63	0	20	7	90,000	Brest .	1930	Bldg.	..	..	..	8 *8-in.*, 8 *3·5-in.* A.A., 8 *1-pr.* A.A , 12 M., 3 seaplanes	2 triple	33	..	605
,, .	**Foch** . .										1929	1930								
,, .	**Colbert** . . *See p.* P52.										1928	1930								
A.C. .	**Bearn** † . . .	21,160*	597	1	89	0	29	10	35,000	Chantiers de la Mediterranée, La Seyne	1920	1928	..	3¼	..	8 *6·1-in.*, 6 *3-in.* A.A., 8 *1-pr.* A.A., 12 M. A.A., 27 planes	4	21·6	— / 2070	875
A.T. .	**Commandant Teste**	10,000	548	0	88	7	23	6	21,000	Chantiers de la Gironde, Bordeaux	1929	Bldg.	..	..	..	12 *3·9-in.* A.A., 8 *1-pr.* A.A., 12 M., 20 planes	..	20·5	..	..
cr. .	**Suffren** . . . *See p.* P52.	10,000*	636	6	63	2	19	3	90,000	Brest . .	1927	1929	..	..	..	8 *8-in.*, 8 *3·5-in.* A.A., 8 *1·5-in.*, 12 M., 3 seaplanes	2 triple	33	— / 1800	605
,, .	**Tourville** .	9938*	626	8	62	4	19	6	130,000	Lorient .	1926	1928	..	..	..	8 *8-in.*, 8 *3-in.* A.A., 8 *1·5-in.*; 2 seaplanes	2 triple	34	— / 2000	590
,, .	**Duquesne** . *See p.* P52.									Brest .	1925									
,, .	**Duguay-Trouin** *See p.* P53.	7234*	594	10	56	6	17	0	100,000	Brest . .	1923	1926	..	..	..	8 *6·1-in.*, 4 *3-in.* A.A., 2 *3-pr.*, 2 M., 1 L., 2 seaplanes	4 triple	33·4 *t*	— / 1480	574
,, .	**La Motte Picquet** *See p.* P53.	7234*	594	10	56	6	17	0	100,000	Lorient . .	1924	1926	..	..	..	8 *6·1 in.*, 4 *3-in.* A.A., 2 *3-pr.*, 2 M., 1 L., 2 seaplanes	4 triple	33·1 *t*	— / 1480	574
,, .	**Metz** (*ex*-**Königsberg**) *See p.* P55.	6100*	496	11	47	0	16	6	36,400	Bremen (Weser)	1915	1916	..	2½	1	8 *5·9-in.*, 2 *3-in.* A.A., 4 M.	2 sub. 2 a.w.	27·5	1270 / 500	433

cr.	**Mulhouse** (*ex*-Stralsund) *See p.* P56.	5120	455	0	44	0	16	9	24,200 *t* (tur.)	Bremen(Weser)	1912	1913	416,340	4–2½	2	7 *5·9-in.*, 2 *3-in.* A.A., 2 M.	2	28·27 *t*	1200 130	454
„	**Primauguet** *See p.* P53.	7234*	594	10	56	6	17	0	100,000	Brest . .	1924	1926	..	..	..	2 *6·1-in.*, 4 *3-in.* A.A., 2 *3-pr.*, 2 M., 1 L., 2 sea-planes	4 triple	33·1 *t*	— 1480	574
„	**Strasbourg** (*ex*-Regensburg) *See p.* P55.	5511	468	1	45	0	17	0	30,000 (P. tur.)	Bremen(Weser)	1914	1914	417,810	4–2½	2	7 *5·9-in.*, 2 *3-in.* A.A., 4 M.	4	27·0	1200 380	438
„	**Thionville** (*ex*-Novara) *See p.* P56.	3395*	428	7	42	0	15	6	25,000 (tur.)	Fiume . .	1913	1914	..	2½	..	9 *3·9-in.*, 2 *3-in.* A.A., 1 M.	2 twin	27·0	800 —	430

* Standard displacement (Washington Treaty).

† Originally designed as battleship.

River Gunboat.—**Francis Garnier**, completed 1929, 750 tons, 15 knots, mounting two 4-in., one 3-in. A.A., two 2-pr., 4 M.

Minesweepers.—**Vaillante, Conquérante** completed 1918, 424 tons, 17 knots, mounting two 3·9-in. guns; **Luronne**, completed 1917, 295 tons, 13·8 knots, mounting two 3·9-in. guns; **Impétueuse, Batailleuse, Audacieuse**, completed 1917, 348 tons, 15 knots, mounting two 3·9-in. guns; **Éveillé, Engageante**, completed 1917, 360 tons, 17 knots, mounting two 3·9-in. guns; **Agile, Inconstant, Ardent**, completed 1916, 354 tons, 17 knots, mounting two 3·9-in., three 1-pr. A.A.; **Sans-Souci, Étourdi, Alerte**, completed 1916, 354 tons, 17 knots, mounting two 3·9-in. guns; **Gracieuse, Capricieuse, Dédaigneuse, Malicieuse, Topageuse, Diligente, Surveillante**, completed 1916, 348 tons, 15 knots, mounting two 3·9-in. guns; **Granit, Mica, Porphyre, Meulière, Quartz**, completed 1918, 394 tons, 12·5 knots, mounting one 9-pr. gun. One minesweeper netlayer authorised for commencement in 1931, 2,290 tons.

Minelayers.—**Pluton**, building, 5,215 tons, 30 knots, mounting four 5·4-in., ten 1-pr. A.A., 12 M., 1000 mines. One building, 5,890 tons; **Castor**, 3,150 tons, 3 3·9-in., 2 1·5 A.A.; **Pollux**, 2,460 tons, completed 1930.

Submarine Parent Ship.—**Jules Verne**, building, 5,904 tons, 16 knots, mounting four 3·5-in. A.A., four 1·5-in. A.A.

Sloops.—**Bougainville** (A 1), **Dumont D'urville** (A 2), **A 3, A 4** building, 197 tons, 4,000 H.P., 15·50 knots, armament three 5·1-in., four 1-pr. A.A., 6 M., 1 seaplane. **Ville d'Ys**, completed 1917, 1,378 tons, 17·5 knots, mounting three 3·9-in., three 3-in., two 3-pr., 2 M.; **Régulus, Cassiopée**, completed 1917, 1,378 tons, 17 knots, mounting two 5·5-in., two 3-in. A.A., 2 M.; **Antares, Aldébaran, Bellatrix, Algol, Altair**, completed 1916, 1378 tons, 17 knots, mounting two 5·5-in., two 3-in. A.A., 2 M. Two slopes authorized for commencement in 1931.

Despatch Vessels.—**Du Couedic, Enseigne Henry, Duperré, Duchaffault, Dubourdieu**, completed 1919–1920, 512 tons, 17 knots, mounting one 5·5-in., one 3·9-in.; **Mondemont, Montmirail, Remiremont, Baccarat, Bethune, Vitry-le-Francois, Lievin, Calais, Lassigny, Les Esparges, Vauquois, Vimy, Craonne, Dunkerque, Epinal, Nancy, Coucy, Laffaux, Amiens, Toul, Tahure, Arras, Bapaume**, completed 1919–1924, 748 tons, 20 knots, mounting two 5·5-in., one 3-in. A.A., 2 M.; **Escaut, Ailette, Ancre, Scarpe, Suippe, Meuse, Yser, Somme, Oise, Aisne, Marne, Quentin-Roosvelt**, completed 1917–1919, 570–694 tons, 21 knots, mounting four 3·9-in., one–two 9-pr., one–three 3-pr.

One net-layer is authorised.

GERMANY.—Armoured Ships.

Class.	NAME.	Displacement.	Length. (Extreme.)	Beam.	Draught.	Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal. / Oil.	Complement.
		tons.	ft. ins.	ft. ins.	ft. ins.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b.	**Ersatz Preussen** *See* p. P57.	10,000	—	—	—	50,000 Diesel	Deutsche Werke, Kiel	1930	Bldg.	—	—	—	—	—	—	—	6 *11-in.*, 8 *5·9-in.*, 4 *3·4-in.*	4	26	— 1200	—
b.	**Braunschweig** *	12,997	413 5	72 10	25 3	17,092 T.S. & C.*t*	Germania	1902	1904	1,157,500	9–4 K.S.	3	6 K.S.	6 K.S.	10–6 K.S.	6 K.S.	4 *11-in.*, 12 *6·7-in.*, 8 *3·4-in.*, 23 M.	4 (a.w.)	18·43 *t*	1574 197	727
b.	**Elsass**	12,997	413 5	72 10	25 3	16,685 W.T.&C.*t*	Danzig (Schichau)	1903	1905	1,157,500	9–4 K.S.	3	6 K.S.	6 K.S.	10–6 K.S.	6 K.S.	4 *11-in.*, 14 *6·7-in.*, 18 *22-pr.*, 23 M.	5 (1 sub. 4 a.w.)	18·0 *t*	1574 197	727
b.	**Hannover**	13,040	413 1	72 10	25 3	17,768 T.S. *t.*	Wilhelmshaven	1905	1907	1,157,500	9½–4 K.S.	3	8 K.S.	6 K.S.	10–6 K.S.	6¾ K.S.	4 *11-in.*, 14 *6·7-in.*, 12 *3·4-in.*, 23 M.	4 (a.w.)	18·5 *t*	1771 197	727
b.	**Hessen**	12,997	413 5	72 10	25 3	16,000 T.S. & C.	Kiel (Germania)	1903	1905	1,157,500	9–4 K.S.	3	6 K.S.	6 K.S.	10–6 K.S.	6 K.S.	4 *11-in.*, 14 *6·7-in.*, 18 *22-pr.*, 23 M.	5 (1 sub. 4 a.w.)	18·0	1574 197	727
b.	**Lothringen** *	12,997	413 1	72 10	25 3	16,950 W.T.&C.*t*	Schichau (Danzig)	1904	1906	1,157,500	9–4 K.S.	3	6 K.S.	6 K.S.	10–6 K.S.	6 K.S.	4 *11-in.*, 14 *6·7-in.*, 18 *3·4-in.*	5 (1 sub. 4 a.w.)	18·54 *t*	1574 197	727
b. *b.*	**Schlesien** **Schleswig-Holstein**	13,040	413 1	72 10	25 3	19,465 *t* 19,868 T.S.&C.*t*	Schichau Germania	1906	1908	1,214,000	9½–4 K.S.	3	8 K.S.	6 K.S.	11–6 K.S.	6¾ K.S.	4 *11-in.*, 14 *5·9-in.*, 20 *22-pr.*, 6 *3·4-in.*, 2 *3-in.*, 23 M.	5 (1 sub. 4 a.w.)	18·5 19·0 *t*	1771 197	727

* Paid off.

The old battleship Zahringen is fitted out as a distantly controlled target vessel. Modernization of Hannover completed 1930.

Three armoured ships are projected, but no money is yet voted for these.

GERMANY.—Cruising Ships, etc.

Class.	NAME.	Displacement.	Length. (Extreme.)		Beam. (Extreme.)		Draught.		Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Fuel. Coal. / Oil.	Complement.
		tons.	ft.	ins.	ft.	ins.	ft.	ins.						£	in.	in.			knots.	tons.	
l.c.	**Leipzig** . . *See p.* P59.	6000	543	10	53	5	15	7	72,000	Wilhelmshaven	..	1929	Bldg.	..	..	..	9 *5·9-in.*, 4 *3·4-in.* A.A.	4 triple	32	— / 1500	..
l.c.	**Köln** . .	6000	570	10	49	10	17	8	65,000	Wilhelmshaven	..	1928	1930	..	..	..	9 *5·9-in*, 4 *3·4-in.* A.A.	4 triple	32	— / 1200	500
l.c.	**Karlsruhe**									Deutsche Werke, Kiel	..	1927	1929	..	..	..					
l.c.	**Königsberg** *See p.* P58.									Wilhelmshaven	..	1927	1929	..	..	..					
l.c.	**Emden** . . *See p.* P60.	6000	510	2	46	11	17	4	46,000	Wilhelmshaven	.	1925	1925	..	..	..	8 *5·9-in.*, 2 *3·4-in.* A.A.	4 twin	29	1100 / 700	483
l.c.	**Berlin** * .	3200	362	7	43	4	16	5	10,857 *t*	Danzig Dockyard	..	1903	1905	..	..	..	10 *4·1-in.*, 18 M.	2	22·6 *t*	846 / —	350
l.c.	**Hamburg** *								10,746 *t*	Vulcan, Stettin	..	1903	1904	..	..	..					
l.c.	**Arkona** . .	2656	342	6	40	4	16	5	8,290 *t*	Weser . .	..	1902	1903	..	..	..	10 *4·1-in.*, 18 M.	2	21 *t*	700 / —	330
l.c.	**Amazone** .	2608	342	6	38	9	16	5	8,000	Germania .	..	1900	1901	..	..	..	10 *4·1-in.*, 18 M.	2	22	570 / —	330
l.c.	**Nymphe** .									Germania .	..	1899	1900	..	..	..	10 *4·1-in.*, 4 M.				

* Training Ships.

Arkona is used as an accommodation vessel. Gunboats Drache, Hay. Surveying vessels Meteor and Panther.

Two fishery protection vessels and a tender Ersatz Drache are building.

GREECE.—Armoured Ships.

Class.	NAME.	Displacement.	Length. (Extreme.)	Beam.	Draught.	Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Second-ary.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	**Giorgios Averoff** * *See p.* P61.	9956	462	69	24¾	21,500 B. *t*	Leghorn (Orlando)	1910	1911	1,100,000	8–3½ K.S.	1¾	7	7	8–6½	7	4 *9·2-in.*, 8 *7·5-in.*, 16 *3-in.*, 4 *3-pr.*, 2 *3-in.* A.A., 2 M.	3 (sub.)	24·0 *t.*	1500 —	..
b.	**Kilkis** † (*ex* Mississippi)	13,000	382	77	24¾	13,765 B.&W. *t*	Phila-delphia	1905	1908	616,360	9–4 K.S.	3½–1 K.S.	7 K.S.	7 K.S.	10–7½ K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 8 *7-in.*, 8 *3-in.*, 2 *3-in.* A.A., 4 *6-pr.*, 4 *1-pr.*, 8 M., 2 L.	2 (sub.)	17·1 *t.*	1820 —	800
b.	**Lemnos** (*ex* Idaho) *See p.* P61.																				
b.c.	**Salamis** (*ex* Vasilefs Giorgios)	19,500	570¾	82	25¼	40,000	Hamburg	1914	Bldg.	..	..	..	..	..	..	..	8 *14-in.*, 12 *6-in.*, 12 *12-pr.*	2 (sub.)	24	..	..

* Retubed and refitted 1927.

† Retubed and refitted 1926.

The old coast defence vessel Spetsai is used in the training service. The Salamis is still in the same condition as when launched.

GREECE.—Cruising Ships.

Class.	NAME.	Displacement.	Length. (Extreme.)	Beam.	Draught.	Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Fuel.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.		Coal. Oil.	
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
cr.	**Helle** ‡ (*ex* Fei-Hung)	2600	322	39	14	6500 tur.	Camden, N.J. .	1912	1914	240,000	¾	..	3 *4-in.*, 1 *3-in.* A.A., 110 mines	2	20	600 100	230

‡ Repaired in France and fitted as a minelayer in 1929.

Old gunboat, Amvrakia, 470 tons. **Training ship, Ares, 1811 tons, 10 knots, four 3-in. guns, completed at Chantiers de la Mediterranée, la Seyne, 1929. Repair ship, Hephestos, 4,921 tons gross, 11½ knots.**

ITALY.—Armoured Ships.

Class.	NAME. DATE FOR SCRAPPING.*	Standard Displacement. (Washington Treaty.)	Length. (Extreme.)		Beam.		Draught.	Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Fuel. Coal. / Oil.	Complement
													Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position.		Guns.	Torpedo Tubes.			
																	Heavy Guns.	Second-ary.					
		tons.	ft.	ins.	ft.	ins.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b. 1st Cl.	**Andrea Doria** 1937	22,630	575	9	92	0	29	24,000 P. tur. Y.	Spezia . .	1913	1915	..	10–4 K.S.	1¾	6 K.S.	..	9½ K.S.	6 K.S.	13 *12-in.*, 16 *6-in.*, 13 *3-in.*, 6 *3-in.* A.A., 2 *2-pr.*, 6 M., 4 L.	2 (sub.)	21	1430 / 840	1074
b. 1st Cl.	**Caio Duilio** . 1936 *See p.* P62.								Castellammare	1913	1915										21·3		
b. 1st Cl.	**Conte di Cavour** 1936 *See p.* P63.	22,030	575	9	92	0	29	24,000 Parsons B. & W.	Spezia . .	1911	1915	..	10–4½ K.S.	1¾	6 K.S.	..	9½ K.S.	5 K.S.	13 *12-in.*, 18 *4·7-in.*, 13 *3-in.*, 6 *3-in.* A.A., 2 *2-pr.*, 2 M., 4 L.	2 (sub.)	21·5	1430 / 840	1074
b. 1st Cl.	**Giulio Cesare** . 1935 *See p.* P63.	22,725	575	9	92	0	28	24,000 P. B.&W. P Bl.	Genoa (Ansaldo)	1911	1914	..	10–4½ K.S.	1¾	6 K.S.	..	9½ K.S.	5	13 *12-in.*, 18 *4·7-in.*, 13 *3-in.*, 6 *3-in.* A.A., 2 *2-pr.*, 2 M., 4 L.	2 (sub.)	21·5	1430 / 690	1074
a.c.	**Pisa** * . . *See p.* P64.	10,430	460	11	68	11	24¾	20,000 B.	Leghorn (Orlando)	1907	1909	..	8–3½ K.S.	1¾	7 K.S.	7 K.S.	8–6 K.S.	6½	4 *10-in.*, 8 *7·5-in.*, 12 *3-in.*, 6 *3-in.* A.A., 2 *3-pr.*, 4 M., 2 L.	2 (sub.)	23·4	1486 / 138	687
a.c.	**San Giorgio** .	10,000	462	2	69	0	24¾	18000 Bl.	Castellammare	1908	1910	..	8–3½ K.S.	1¾	7 K.S.	7 K.S.	7–6 K.S.	7 K.S.	4 *10-in.*, 8 *7·5-in.*, 10 *3-in.*, 6 *3-in.* A.A., 2 *3-pr.*, 6 M., 2 L.	3 (sub.)	23·2	1476 / 115	643
a.c.	**San Marco**. . *See p.* P64.	10,915						20000 tur.													23 7	1378 / 66	

* Boys' training ship.

ITALY.—Cruising Ships.

Class.	NAME.	Standard Displacement. (Washington Treaty.)	Length. (Extreme.)	Beam.	Draught.	Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Side. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Fuel. Coal. Oil.	Complement.
		tons.	ft. ins.	ft. ins.	ft.					£	in.	in.			knots.	tons.	
cr.	Pola . . .	10,000	..	..	..	..	..	..	Bldg.	..	..	..	.. ..	..	..	..	..
l. cr.	Montecuccoli Attendolo .	5,100	..	..	..	..	Ansaldo, Genoa	..	Bldg.	..	..	..	.. ..	..	..	..	..
„	Gorizia . . . *See p.* P66.	10,000	590 9	..	..	..	Orlando, Leghorn	..	Bldg.	..	..	..	8 *8-in.*, 16 *3·9 in.* A.A. .	..	33	..	..
„	Bolzano . . . *See p.* P65.	10,000	590 9	..	..	..	Ansaldo, Genoa	..	Bldg.	..	..	..	8 *8-in.*, 16 *3·9 in.* A.A. .	8	36	..	..
„	Armando Diaz	4,896	559 0	51 0	14·5	95,000	Odero-Terni, Spezia Stabilimento Tecnico Triestino, Trieste	..	Bldg.	..	..	..	8 *6-in.*, 6 *4-in.* A.A., 8 M. .	4	37	..	..
„	Luigi Cadorna *See p.* P68.																
l. cr.	Zara . .	10,000	600 0	67 6	20·2	..	Odero-Terni, Muggiano Stabilimento Tecnico Triestino, Trieste	1930	Bldg.	..	4 —	..	8 *8-in.*, 16 *3·9-in.* A.A. .	..	33	..	..
„	Fiume . . . *See p.* P66.	10,000														..	..
l. cr.	Alberto da Giussano . .	4896	559 0	51 0	14·5	100,000 t. 95,000	Ansaldo. Sestri-Ponente	1930	1930	..	..	..	.. ..	..	39 t 37	..	..
	Alberico di Barbiano .								Bldg.	..	..	..	8 *6-in.*, 6 *4-in.* A.A., 8M., 1 catapult, 2 seaplanes.	4			
	Bartolomeo Colleoni . .								Bldg.							..	..
	Giov. della Bande Nere . . *See p.* P68.						Castellammare . .		Bldg.								

cr.	**Trieste**	10,000	640	9	67	7	18¾	150,000	Orlando, Leghorn, Trieste	1926	1928	..	..	..	8 *8-in.*, 12 *3·9-in.* A.A., 6 smaller, 1 catapult, 3 seaplanes.	4 (twin)	36	— 1380	800
cr.	**Trento** *See p.* P67.									1927									
l. c.	**Ancona** (*ex* German Graudenz) *See p.* P71.	4842	456	0	45	0	17	26,000	Kiel	1913	1914	..	4–2½ 1	..	7 *5·9-in.*, 3 *3-in.* A.A., 3 M., 120 mines	4 (2sub.)	27·25	1279 400	364
”	**Bari** (*ex*-German Pillau) *See p.* P69.	4252	440	11	46	0	19	28,000 turb.	Danzig (Schichau)	1914	1915	..	— 1½–¾	1	8 *5·9-in.*, 3 *3-in.* A.A., 3 M., 120 mines	2	27·5	984 250	372
”	**Brindisi** (*ex*-Austrian Helgoland) *See p.* P70.	3440	430	0	42	0	15	25,000 Tur.	Fiume	1912	1914	..	2½ ¾	..	9 *3·9-in.*, 1 *3-in.* A.A., 3 M., 1 L., 170 mines	4	27·0	750 —	320
l. c.	**Libia**	4395	367	0	47	6	16	11,500	Genoa (Ansaldo)	1912	1913	..	— 1½	..	8 *4·7-in.*, 3 *3-in.* A.A., 3 M.	2	22·9	640 —	300
A.C.	**Miraglia**	4881	397	0	49	3	17	12,000	Spezia	1923	1925	..	..	..	4 *3 in.* A.A., 1 M., 2 catapults	..	21	..	300
l. cr.	**Quarto** *See p.* P70.	3388	431	9	42	2	13¼	25,000 P.tur.Bl.	Venice	1911	1912	..	— 1½–¾	..	6 *4·7-in.*, 6 *3-in.*, 2 *2-pr.* A.A., 3 M., 126 mines	2	28·6	49 482	240
l. cr.	**Taranto** (*ex*-German Strassburg) *See p.* P69.	4480	446	2	43	7	15¾	25,650 *t* P. tur.	Wilhelmshaven	1911	1912	416,340	4–2½ —	2	7 *5·9-in.*, 2 *3-in.* A.A., 3 M., 120 mines	2 (sub.)	27.5	1200 —	373
l. cr.	**Venezia** (*ex*-Austrian Saida) *See p.* P70.	3145	430	0	42	0	15	25,000 Tur.	Monfalcone	1912	1914	..	2½ ¾	..	9 *3·9-in.*, 1 *3-in.* A.A., 3 M.	4	27·0	750 —	320

Minelayers and minesweepers **Fasana, Buccari, Durazzo, Pelagosa**, completed 1926, 600 tons, 11 knots, 200 mines; **Azio, Legnano, Lepanto, Dardanelli, Milazzo, Ostia**, completed 1926, 700 tons, 15 knots. **Marghera, Brondobo**, 117 tons, 13 knots; **Laurana, Rovigno, Albona**, 130 tons, 11 knots. Minesweepers **Ansonia**, 470 tons, 11·3 knots; **Cotrone, Viesti**, 475 tons, 13·8 knots; 35 in No., 200 tons, 13 knots. Oil transports **Marte, Dalmazia, Istria, Livenza, Urano, Prometeo, Cocito, Lete, Stige, Niobe, Cerere, Giove, Tarvisio. Quarnero.** Oil transport with under-water protection, **Brennero.** Gunboats and river gunboats, **Toselli, Arimondi, Cirene, Gallipoli, G. Lante, Augusta, Otranto, P. Corsini, Rimini, S. Caboto, E. Carlotto.** Escort gunboats. **A. Bafile, T. Farinati, E. Giovannini, C. del Greco, A. Vitturi**, 23 knots. Surveying vessel, **Ammiraglio Magnaghi**, 1800 tons, 14 knots. 104 armed motor boats (M.A.S.) built and 4 under construction.

Training ships **Cristoforo Colombo** built at Castellammare di Stabia, completed 1928, displacement 3,000 tons, 10 knots. **Amerigo Vespucci**, building at Castellammare di Stabia, 2,990 tons, 6 *3-in.* A.A.

Submarine Depôt Ships **Volta** and **Pacinotti**, 2,362 tons, 19 knots, completed 1924.

JAPAN.—Armoured Ships.

Class.	NAME. DATE FOR SCRAPPING.	Standard Displacement.	Length. (Extreme.)		Beam.		Draught.		Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Fuel.	Complement.†
														Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position.		Guns.	Torpedo Tubes.		Coal. / Oil.	
																		Heavy Guns.	Second-ary.					
·		tons.	ft.	ins.	ft.	ins.	ft.	ins.						in.	in.	in	in.	in.	in.			knots.	tons.	
b.	**Fuso** . 1937 *See p.* P74.	29,330	673	0	94	0	28	6	40,000 tur.	Kure .	1914	1915	..	12 K.S.	3	8 K.S.	..	12 K.S.	6 K.S.	12 *14-in.*, 16 *6-in.*, 4 *3-in.* A.A., 4 M., 4 L., 2 seaplanes	6 (sub.)	22·5	4000 / 1300	1272
b.	**Hyuga** . 1940 *See p.* P73.	29,990	683	0	94	0	28	6	45,000 tur.	Nagasaki (Mitsubishi)	1917	1918								12 *14-in.*, 20 *5·5-in.*, 4 *3-n.* A.A., 2 M. H.A., 2 planes	6 (sub.)	23·0	4500 / 1300	1360
b.c.	**Haruna** * 1935	29,330	704	0	92	6	27	0	64,000 My. P. t.	Kobe . (Kawasaki)	1913	1915	..	8–3 K.S.	2¾	6	..	10 K.S.	6 K.S.	8 *14-in.*, 16 *6-in.*, 4 *3-in.* A.A., 4 M., 4 L., 2 planes	4 (sub.)	26·0	4000 / 1000	1250
„	**Hiyei** † . 1935 *See p.* P76.	26,330			92	0	27	6	My. C. t.	Yokosuka .	1912	1914									8 (sub.)	27·5		
b.	**Ise** . 1939 *See p.* P73	29,990	683	0	94	0	28	8	45,000 P. tur.	Kobe . (Kawasaki)	1916	1917	..	12 K.S.	3	8 K.S.	..	12 K.S.	6 K.S.	12 *14-in.*, 20 *5·5-in.*, 4 *3-in.* A.A., 2 M. H.A., 2 seaplanes	6 (sub.)	23·0	4500 / 1300	1360
b.c.	**Kirishima** ‡ . 1936 *See p.* P76.	26,330	704	0	92	6	27	0	64,000 My.P. t.	Nagasaki (Mitsubishi)	1913	1915	..	8–3 K.S.	2¾	6	..	10 K.S.	6 K.S.	8 *14-in.*, 16 *6-in.*, 4 *3-in.*, A.A., 4 M., 4 L.	8 (sub.)	27·5	4000 / 1000	1250

„	**Kongo** ‡ 1934 *See p.* P75	26,330	704	0	92	0	27	6	64,000 Y. P. *t.*	Barrow	1913	1913	2,500,000	8–3 K.S.	2¾	6	..	10 K.S.	6 K.S.	8 *14-in.*, 16 *6-in.*, 4 *3-in.* A.A., 4 M., 4 L., 2 planes	8 (sub)	27·5	4000 1000	1309 (as flag-ship)
b.	**Mutsu** . 1942	32,720	700	0	95	0	30	0	46,000 G	Yokosuka	1920	1921	..	12 K.S.	3½	..	..	..	..	8 *16-in.*, 20 *5·5-in.*, 4 *3-in.* A.A., 1 seaplane	8 (4 sub.)	23·0	1600 3400	1304
b.	**Nagato** . 1941 *See p.* P72.									Kure .	1919	1920												1367 (as fleet flag-ship)
b.	**Yamashiro** 1938 *See p.* P74	29,330	673	0	94	0	28	6	40,000 tur.	Yokosuka	1915	1917	..	12 K.S.	3	8 K.S.	..	12 K.S	6 K.S.	12 *14-in.*, 16 *6-in.*, 6 *3-in.* A.A., 4 M., 4 L., 2 seaplanes	6 (sub.,	22·5	4000 1300	1272

COAST-DEFENCE SHIPS: Asama, Yakumo, Adzuma, Idzumo, Iwate, Nisshin, Kasuga, Tsushima, completed 1899–1904.

* Modernisation, including fitting of bulges and elevation of guns, completed 1929.

† To be disposed of in accordance with London Naval Treaty or may be retained for training purposes only.

‡ Undergoing extensive modernisation, including fitting of bulges and new foremast, modernisation of Kirishima completed 1930.

JAPAN.—Cruising Ships, &c.

Class	NAME.	Standard Displacement.	Length. (Extreme)	Beam.	Draught.	Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Fuel.	Complement.
											Side. / Deck.	Gun Position.	Guns.	Torpedo Tubes.		Coal. / Oil.	
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
A.C.	Ryujo	7,600	..	..	..	40,000	Yokohama	..	Bldg.	..	..	..	12 *5·1-in.*, 24 aircraft	..	25	..	..
cr.	Chokai	10,000	630 p.p.	62½	16½	100,000	Nagasaki	..	Bldg.	..	..	..	10 *8-in.*, 4 *4·7-in.* A.A.	8	33	.	..
cr.	Maya *See p.* P78.						Kobe										
A.C.	Akagi* *See p.* P77.	26,900	770 p.p.	92 3	22 2	131,200 (G.)	Kure	1925	1927	..	..	..	10 *8-in.*, 12 *4·7-in.* A.A., 66 planes	6	28·5	2100 3000	..
cr.	Atago	10,000	630 p.p.	62½	16½	100,000	Kure	1930	Bldg.	..	..	..	10 *8-in.*, 4 *4·7-in.* A.A.	8	33	..	..
”	Takao *See p.* P78.						Yokosuka										
A.C.	Wakamiya	5180	365 p.p.	48¼	19	1,591	England	..	1901	..	..	..	2 *3-in.*, 2 *3-pr.* A.A., 10 sea-planes.	..	11	500 —	140
”	Notoro	14,050	445 p.p.	58	26½	3,750	Kawasaki	1920	1927	.	..	..	2 *5·5-in.*, 2 *3-in.* A.A., 15 sea-planes	..	12	..	..
cr.	Ashigara	10,000	630 p.p.	57½	17¼	100,000	Kobe	1928	1929	..	3 —	..	10 *8-in.*, 6 *4·7-in.* A.A.		33	— 3000	692
”	Haguro						Nagasaki	1927	1929					..			
”	Myoko						Yokosuka	1927	1929								
”	Nachi *See p.* P78.						Kure		1928					12			
l.cr.	Kinugasa	7100	595	51	15¼	100,000	Kawasaki, Kobe	1926	1927	..	..	..	6 *8-in.*, 4 *4·7-in.* A.A.	12	33	400 1400	604
”	Aoba *See p.* P79.						Nagasaki	1926	1927								
”	Furutaka						Uraga	1925	1926	..	..	..	6 *8-in.*, 4 *3-in.* A.A., 2 planes				
”	Kako *See p.* P80.					.	Kawasaki, Kobe	1925	1926								
”	Chikuma					22,500 Cur. t. My.	Sasebo			..	..	..	..	..	..	..	..
		4400	475	46½	16¾			1911	1912	..	2½	..	8 *6-in.*, 2 *3-in.*, 2 *3-in.* A.A., 2 M.	3	26	900 300	410
”	Hirado					22,500 P. tur. My.	Kobe										
”	Yahagi						Nagasaki										
A.C.	Hosho	7470	510 p.p.	62	20¼	30,000 (G.)	Tsurumi (Asano)	1921	1922	..	..	..	4 *5·5-in.*, 2 *3-in.* A.A., 28 planes	..	25	— 2700	550
l.cr.	Abukuma *See p.* P81.	5170	535	46¾	15¾	90,000 (G.)	Uraga	1923	1925	..	2 —	..	7 *5·5-in.*, 2 *3-in.* A.A., 2 M., 1 Pom-pom A.A.	8	33·0	800 1260	450
”	Isudzu						Uraga	1921	1923								
”	Nagara						Sasebo	1922	1922								
”	Natori *See p.* P83.						Nagasaki (Mitsubishi)	1922	1922								

l. cr.	**Yura**		5170	535	47¼	15¾	90,000 (G,)	**Sasebo**	1922	1923	..	2/—	..	7 *5·5-in.* 2 *3-in.* A.A., 2 M., 1 Pom-pom A.A.	8	33·0	300/1260	450
,,	**Kinu**	*See p.* P83.						Kawasaki	1922	1922								
A.C.	**Kaga** †		26,900	715 p.p.	102	22 1	91,000	Kobe (Kawasaki)	1921	Bldg.	..	..	..	10 *8-in.*, 12 *4·7-in.* A.A., 66 aircraft	6	23	—/5300	..
l. cr.	**Jintsu**		5195	535	46¾	15¾	90,000	Kawasaki	1923	1925	..	2/—	..	7 *5·5-in.*, 3 *3-in.* A.A., 2 M., 1 Pom-pom A.A.	8	33·0	300/1260	450
,,	**Naka**							Yokohama	1925	1925								
,,	**Sendai**	*See p.* P81.						Nagasaki	1923	1924								
,,	**Kiso**	*See p.* P83.	5100	535	46¾	15¾	90,000 (G.)	Nagasaki	1920	1921	..	2/—	..	7 *5·5-in.*, 2 *3-in.* A.A., 2 M., 1 Pom-pom A.A., 80 mines	8	33·0	300/1260	439
,,	**Kitakami**	*See p.* P83.						Sasebo	1920	1921								
,,	**Kuma**	*See p.* P83.						Sasebo	1919	1920								
,,	**O.I**	*See p.* P83.						Kobe	1920	1921								
,,	**Tama**	*See p.* P83.						Nagasaki (Mitsubishi)	1920	1921								
,,	**Tatsuta**		3230	468	40¾	13	51,000 (G.)	Sasebo	1918	1919	..	..	..	4 *5·5-in.*, 1 *3-in.* A.A., 2 M.	6	31	—/900	332
,,	**Tenryu**	*See p.* P83.						Yokosuka										
,,	**Tone**		3760	406	47⅙	16¾	15,000 My	Sasebo	1907	1910	..	2½	..	2 *6-in.*, 10 *4·7-in.*, 2 *3-in.* A.A., 2 *12-pr.*, 2 M.	3	23·0	892/124	401
,,	**Yubari**	*See p.* P82.	2890	465	39½	11¾	55,000 (Estimated.)	Sasebo	1923	1923	..	..	..	6 *5·5-in.*, 1 *3-in.* A.A., 2 M., 34 mines	4	33	—/820	328

* Re-designed from battle cruiser.

† Re-designed from battleship.

Minelayers.—Katsuriki, 1917, 1,540 tons, 13 knots, 3 3·3-in., 150 mines; Itsukushima, launched at Uraga 1929, 1,940 tons, 17 knots, and one building, Yayeyama, similar to Itsukushima. Also Aso (old cruiser converted), 1903, 7,180 tons, 22 knots, 8 6-in., 1 3-in. A.A., 420 mines, and 17 smaller.

Minesweepers.—Nos. 1, 2, 3 (1923), No. 4 (1925), and Nos. 5, 6 (1929), 700 tons, 20 knots, 2 4·7-in., 1 3-in. A.A.

Gunboats.—Saga (1912), 785 tons, 15 knots, 1 4·7-in., 3 3-in.; Uji (1903), 620 tons. 13 knots, 4 3-in.

River Gunboats.—Futami, 400 tons, built at Fujinagata, Osaka, completed 1930; Atami (1929), 170 tons, 16 knots. Katata, Hira, Hodzu, Seta (1923), 305 tons, 16 knots, 2 3-in. A.A.; Ataka (1922), 820 tons, 16 knots, 2 4·7-in., 2 3-in. A.A.; Toba (1911), 250 tons, 15 knots, 2 3-in.; Fushimi (1906), 180 tons, 14 knots, 2 6-pr.; Sumida (1906), 126 tons, 13 knots, 2 6-pr.

Submarine Depôt Ships.—Chogei (1924), Jingei (1923), 5,160 tons; Komahashi (1914), 1,230 tons.

Anti-Submarine Ships.—Shirataka, completed January, 1929, 1,324 tons, 16 knots speed, three 4·7-in. A.A. guns. The Tsubane and Kamone, 443 tons, are now completed.

11 light cruisers projected, to be completed before Dec., 1936. 3 vessels of "Kuma" class to be retained for training purposes only, in accordance with London Naval Treaty.

NETHERLANDS.

Class.	NAME.	Displacement.	Length. (Extreme.)	Beam.	Draught.	Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Fuel.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Second-ary.	Guns.	Torpedo Tubes.		Coal. Oil.	
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots	tons.	
a.g.b.	**Brinio**	540	171	28	9¼	1200	Amsterdam	1912	1914	..	2 K.S.	¾	..	..	..	..	4 4·*1-in.*, 2 M.	..	14	34 Oil	52
,,	**Friso**							1912	1914												
,,	**Gruno**							1913	1915												
c.d.s.	**Hertog Hendrik** *See p.* P84.	5000	317	50	19	6282 *t.*	Amsterdam	1902	1903	347,500	6 H.N.S.	2	..	..	10 H.N.S.	3 H.S.	2 *9·4-in.*, 6 *5·9-in.*, 4 *3-in.*, 1 *9-pr.*, 4 *1-pr.*, 2 M.	3 2 sub.	16·5 *t*	710 —	347
,,	**Jacob van Heemskerck ***	4921	321½	50	19	6396 *t.*	Amsterdam	1906	1908	347,500	6–4 H.N.S.	2	..	..	10 H.N.S.	6 H.N.S.	2 *9·4-in.*, 6 *5·9-in.*, 6 *3-in.*, 1 *9-pr.*, 4 *1-pr.*, 2 M.	2 (sub.)	16·5 *t*	520 —	351
l. cr.	**Java**	6930	509½	52½	18	65,000	Flushing	1921	1925	..	3	..	1	..	4	..	10 *5·9-in.*, 4 *3-in.* A.A., 8 M., 40 mines.	—	30	— 1070	490
,,	**Sumatra**						Amsterdam	1920	1926												
c.d.s.	**Marten Tromp *** *See p.* P84.	5216	330	50	18¾	6405 *t*	Amsterdam	1904	1906	347,500	6–4 H.N.S.	2	..	..	10 H.N.S.	3 H.S.	2 *9·4-in.*, 4 *5·9-in.*, 8 *3-in.*, 1 *9-pr.*, 4 *1-pr.*, 2 M.	2 (sub.)	16·7 *t*	710 —	349
c.d.s.	**De Zeven Provincien ***	6426	333	56	20¼	8516 Y. *t*	Amsterdam	1909	1910	..	6–4 K.S	2	..	..	10 K.S.	4 K.S.	2 *11-in.*, 4 *5·9-in.*, 10 *3-in.*, 1 *9-pr.*, 4 *1-pr.*, 2 M.	..	16·3 *t*	885 —	409

One cruiser is projected for the Indian Military Marine but no money is yet voted for it.

The Java and Sumatra are assigned to the Indian Military Marine. Light cruiser Gelderland (1900), 3,966 tons, now used as gunnery training ship. Four old gunboats: Hefring, 265 tons, Braga, Tyr and Freyr, 275 tons. Gunboats in the Indian Military Marine: Soemba, Flores, completed 1926 and 1927 respectively, of 1,676 tons, 15 knots, three 5·9 in., 1 3-in. A.A., 2 M. Minelayers: Nautilus, completed 1930, 955 tons, 14 knots, two 3-in., two 1-pr., 2 M., and one authorised for commencement this year; Douwe Aukes, Van Meerlant (1922), 749 tons, 13·5 knots, three 3-in. A.A., 2 M., 30 mines; Medusa and Hydra (1911), 670 tons, 11·5 knots, three 3-in., one 1-pr., 1 M., 65 mines; and eight old vessels. Minelayers attached to Indian Military Marine: Krakatau (1924), 1,120 tons, 17 knots, two 3-in. A.A., 2 M., 150 mines; Pro Patria (1923), 605 tons, 11 knots, one 3-in. A.A., 2 M., 80 mines, and four old vessels. Four minesweepers: I.–IV., 270–295 tons. Minesweepers built for the Indian Military Marine: A, B, C, D, completed 1930, 187 tons; 12 knots; and one 1600 tons building. Surveying vessels: Eilerts de Haan, Hydrograaf, and Willebrord Snellius; and in the Indian Military Marine, Van Doorn, Van Gogh, Tydeman. Submarine depôt ship in Indian Military Marine, Pelikaan (1922), 2,600 tons, 12 knots, four 2·75 in., 4 M. Two minelayers are building for the Indian Military Marine, Prins Van Oranje and Goudon Leeuw, and one more is authorised for commencement this year.

One gunboat is projected but no money voted.

4 C.M.B.'s.

*** Of little fighting value.**

NORWAY.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Fuel. Coal. / Oil.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			in.	in.			knots.	tons.	
c.d.s.	Eidsvold . Norge . *See p.* P84.	4166	310¼	50½	16½	5100 Y. *t*	Elswick	1900	1901	350,000	6 H.N.S.	2	..	..	6 H.N.S.	6 H.N.S.	2 *8·2-in.* 6 *5·9-in.*, 8 *3-in.*, 6 *3-pr.*	2 (sub.)	16·9 *t*	550 —	270
”	Harald Haarfagre . .	3860	304	48½	16½	4720 *t*	Elswick	1896	1898	300,000	7 H.S.	2	..	..	8 H.S.	..	2 *8·2-in.*, 6 *4·7-in.*, 6 *3-in.*, 6 M.	3 2 sub.	17·2 *t*	550 —	249
”	Tordenskjold							1897	1899												

Cruising Ship.

Class.	NAME.	Displacement.	Length. (Extreme.)	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
g.b. 2nd Cl.	Æger . . .	413	108½	29½	8	350	Horten .	1892	1893	..	1½	..	1 *8·2-in.*, 1 *2·7-in.*, 2 *1·9-in.* . . .	—	9·0	22	43

Minelayers Fröya (1918), 760 tons, 22 knots, 100 mines; Glommen and Laugen (1918), 350 tons, 10 knots, 50 mines; seven old gunboats refitted as minelayers 230–280 tons. One minelayer is authorised, 1600 tons, 20 knots, 4 4·7-in. guns, 280 mines, and one fishery protection vessel is building. Four sloops and six minelayers are projected but no money has yet been voted for these.

SOVIET UNION.—Armoured Ships.

Class	NAME.	Displacement.	Length (Extreme).	Beam.	Draught.	Horse-Power.	Where Built.	Makers of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Fuel.	Complement.
												Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Second-ary.	Guns.	Torpedo Tubes.		Coal. Oil.	
		tons.	ft.	ft.	ft.							in.	in.	in.	in.	in.	in.			knots.	tons.	
b. b. b. b.	Pariskaia Kommuna October Revolution (*ex*-Gangut) Marat Michael Frunze (*ex*-Poltava)	23,000	594	87	27½	42,000	Baltic Works	Baltic Works	1911	1915	..	9–5	3	..	..	12–10	6	12 *12-in.*, 16 *4·7 in.*, 2 *9-pr.* A.A., 1 *3-pr.*	4 (sub.)	23	2000 1000	1130
b.	General Alexieff*	22,600	551¼	89¾	27	26,500	Nikolaev R.S.B.Co.	..	1914	1917	..	12–4	3–1½	9–8	..	12–8	5	12 *12-in.*, 18 *5-in.*, 4 *2·5-in.* A.A., 4 *3-pr.*, 8 *11-pr.*, 4 M.	4 (sub.)	21	2300 729	1252

* Under French protection.

Cruising Ships.

Class.	NAME.	Displacement.	Length (Extreme.)	Beam.	Draught.	Horse-Power.	Where built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Fuel.	Complement.
											Belt. Deck.	Gun Position.	Guns.	Torpedo Tubes.		Coal Oil	
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
l. cr.	**Aurora** (*ex*-S.S.S.R)	6730	416	55	21	11,600	Petrograd	1900	1903	..	..	..	14 *6-in.*, 5 *6-pr.* A.A., 2 M.	..	20	964 —	578
„	**Almaz** *	3300	363	43½	17½	7,500	..	1903	1904	..	— 3	..	7 *4·7-in.*, 2 M.	..	19	650 —	300
„	**Chevonaya-Ukrainia**	7600	535½	51½	18½	55,000	Nikolaev	1915	1923	..	..	..	15 *5·1-in.*, 4 *3-in.* A.A., 4 M., 100 mines, 2 seaplanes	2 (sub.)	29½	540 690	600
„	**Komintern**	6675	440	54½	20½	19,500	Nikolaev	1903	1907	..	..	..	15 *5·1-in.*, 4 *3-in.*, 4 *6-pr.*	2 (sub.)	23	1190 —	595
„	**General Kornilov** *	6675	439½	54½	20½	19,500	Sevastopol	1902	1905	..	..	..	16 *6-in.*, 2 *11-pr.*	2 (sub.)	23	1100 —	595
„	**Krasni Kavkaz** (*ex*-Lazarev)	7600	535⅓	51½	18½	55,000	Nikolaev	1916	Bldg.	..	3 1	3	15 *5·1-in.*, 4 *3-in.* A.A., 4 M., 100 mines	2 (sub.)	29½	540 690	..
„	**Profintern**	6800	507¾	50⅓	18⅓	50,000	Reval	1915	1925	..	3 1	3	15 *5·1-in.*, 4 *4-in.* A.A., 4 *3-in.*, 4 M.	2 (sub.)	29½	1167 —	..

* Under French protection.

SPAIN.—Armoured Ships.

NAME.	Displacement.	Length. (Extreme.)	Beam.	Draught.	Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Fuel.	Complement.
										Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Second-ary.	Guns.	Torpedo Tubes.		Coal. Oil.	
	tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
Alfonso XIII. . *See p.* P85.	15,452	459¼	78¾	25½	15,500Y. P. tur.	Ferrol .	1913	1916	..	9–4 K.S.	2–1	6–5 K.S.	6–3 K.S.	10 K.S.	3 K.	8 *12-in.*, 20 *4-in.*, 2 *3-pr.*, 2 l., 2 M.	—	19·5	1850 20	854
a.c. **Cataluña** . .	7405	383¾	61	23¼	10,580 *t*	Cartagena .	1900	1908	600,000	12–10	2	..	12	10½	..	2 *9·4-in.*, 8 *5·5-in.*, 2 *3-in.*, 8 *6-pr.*	..	18·8 *t*	1178 —	442
Jaime I. . . *See p.* P85.	15,700	459¼	78¾	25½	15,500Y. P. tur.	Ferrol .	1914	1922	..	9–4 K.S.	2–1	6–5 K.S.	6–3 K.S.	10 K.S.	3 K.	8 *12-in.*, 20 *4-in.*, 4 *3-pr.*, 4 *3-pr.* A.A., 2 M.	..	20·2 *t*	1850 20	854

SPAIN.—Cruising Ships.

Class.	NAME.	Displacement.	Length. (Extreme.)	Beam.	Draught.	Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Fuel.	Complement.
											Side. / Deck.	Gun Position.	Guns.	Torpedo Tubes.		Coal. / Oil.	
		tons.	ft.	ft.	ft.					£	ins.				knots.	tons.	
l. cr.	Canarias.	10,000	636	64	17·4	90,000	Ferrol	1930	Bldg.	..	4*/3	1	8 *8-in.*, 6 *4·7-in.*, 4 *4·7-in.* A.A., 8 *2-pr.* A.A., 2 seaplanes	12	33·0	—/2750	700
"	Baleares																
"	Miguel de Cervantes	7850	579½	54½	16½	80,000	Ferrol	1928	Bldg.	..	3/—	..	8 *6-in.*, 4 *4-in.* A.A., 2 *3-pr.*, 1 M.	12	33·0	—/1680	560
"	Almirante Cervera *See p.* P86.							1925	1928								
"	Principe Alfonso *See p.* P86.							1925	1927								
g.b.	Bonifaz	787	213¾	30	9½	1100 Y	Cartagena	1911	1912	..	..	..	4 *3-in.*, 2 M.	..	14·0	148/—	121
"	Eduardo Dato	1335	253½	33½	11¼	1700	Ferrol	1923	1925	..	..	..	4 *4-in.*, 2 M.	..	15	324/—	131
"	Jose Canalejas							1922	1924								
"	Antonio Canovas del Castillo							1922	1923								
l. cr.	Extremadura	2100	288	36	16¼	7000 T	Cadiz	1900	1902	..	—/2	..	8 *4-in.* (Vickers), 4 *6-pr.*, 4 *1-pr.*	..	19·0	425/—	266
g.b.	Lauria	787	213¾	30	9½	1100 Y	Cartagena	1912	1912	..	..	..	4 *3-in.*, 2 M.	..	14·0	148/—	121
"	Laya							1911	1911								
"	Recalde	787	213	30	9½	1100 Y	Cartagena	1911	1911	..	..	..	4 *3-in.*, 2 M.	..	13·8*t*	8/—	121
l. cr.	Reina Victoria Eugenia *See p.* P87.	6130	462	50	15¾	25,500 P.T.	Ferrol	1920	1922	..	3–1½/—	3	9 *6-in.*, 4 *3-pr.* A.A., 1 *3-in.*, 4 M., 1 L.	4	25·5	1200/230	404
"	Don Blas Lezo	4650	462	46	14½	45,000	Ferrol	1923	1925	..	..	..	6 *6-in.*, 4 *3-pr.* A.A., 4 M.	12	29·0	800/500	320
"	Mendez Nuñez *See p.* P87.							1922	1924						29·5*t*		

Seaplane-carrier Dédalo 10,800 tons, converted 1922, can carry 2 small dirigibles, 2 balloons, and 25 planes, two 4·1-in., four 3-in. A.A.

Motor-launches, M 1, 2, 4, 5, 6; H 2, 3, 4, 40 tons. Training ships: Sebastian Elcano (1928), 3,500 tons, 9·5 knots; Galatea (*ex*-Clarastella), 2,500 tons, bought in Italy. **Several mine-trawlers and auxiliaries.**

Submarine salvage vessel Kanguro (1917), 3,000 tons, 10 knots, four 2-pr.

Three coastguard patrol vessels, 250 tons, authorised.

* And to magazines.

SWEDEN.

Class.	NAME.	Displacement.	Length. (Extreme.)	Beam.	Draught.	Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Fuel		Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position.		Guns.	Torpedo Tubes.		Coal.	Oil.	
															Heavy Guns.	Second-ary.						
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.		
c.d.b.	**Aran** . . .	3592	287	49¼	16·7	6500 Y.	Gothenburg	1901	1902	..	7 K.S.	1⅞	..	..	7½ K.S.	5 K.S.	2 *8·2-in.*, 6 *5·9-in.*, 10 *6-pr.*, 1 *1-pr.*	2 sub.	17·2 *t*	300	—	287
„	**Drottning-Victoria** *See p.* P88.	7500	396·7	61	21½	22,000 tur. Y.	Gothenburg	1917	1921	666,000	8–6 K.S.	1½	4 H S.	..	8 K.S.	5 K.S.	4 *11-in.*, 8 *5·9-in.*, 6 *3-in.*, 2 *6-pr.*, 2 M.	..	23·0	690	98	450
a.c.	**Fylgia** . .	4902	377·6	48·5	20·6	12,440 Y. *t*	Stockholm .	1905	1907	385,700	4 K.S.	2	..	..	5 K.S.	5 K.S.	8 *5·9-in.*, 10 *6-pr.*, 2 *1-pr.* .	2 sub.	22·5 *t*	900	—	328
cr.	**Gotland** . .	5000	472	48½	14·7	40,000	Gothenburg	..	Bldg.	..	..	..	..	..	..	..	6 *6-in.*, 4 *3-in.* A.A., 4 M., 100 mines, 8 seaplanes	6	28·5	—		453
c.d.b.	**Gustav V.** . *See p.* P89.	7500	396·7	61	21½	22,000 tur. Y.	Malmö . .	1918	1921	666,000	8–6 K.S.	1½	4 H.S.	..	8 K.S.	5 K.S.	4 *11-in.* 8 *5·9-in.*, 6 *3-in.*, 2 *6-pr.*, 2 M.	..	23·0	690	98	450
„	**Manligheten** .	3780	287	49¼	17·4	7400 Y.	Malmö .	1903	1904	..	7 K.S.	1⅞	..	..	7½ K.S.	5 K.S.	2 *8·2-in.*, 6 *5·9-in.*, 10 *6-pr.*, 1 *1-pr.*	2 sub.	17·0	300	—	287
„	**Oscar II** . . *See p.* P88.	4584	313·6	50·5	18	9000 Y.	Gothenburg	1905	1907	..	6 K.S.	2	6 K.S.	6 K.S.	7½ K.S.	5 K.S.	2 *8·2-in.*, 8 *5·9-in.*, 8 *6-pr.*, 1 *1-pr.*	2 sub.	18·0	500	—	330
„	**Sverige** . . *See p.* P89.	6990	392·7	61	21½	20,000 tur. Y.	Gothenburg	1915	1917	666,000	8–6 K S.	1½	4 K.S.	..	8 K.S.	5 K.S.	4 *11-in.*, 8 *5·9-in.*, 6 *12-pr.*, 2 *6-pr.*, 2 M.	..	22·5	690	98	450
„	**Tapperheten** .	3780	287	49¼	17·7	6000 Y.	Malmö .	1901	1903	..	7 K.S.	1⅞	..	..	7½ K.S.	5 K.S.	2 *8·2-in.*, 6 *5·9-in.*, 10 *6-pr.*, 1 *1-pr.*	2 sub.	16·5	300	—	287
„	**Wasa** . .	3686	287	49¼	17	6000 Y.	Stockholm .	1901	1902	..	7 K.S.	1⅞	..	..	7½ K.S.	5 K.S.	2 *8·2-in.*, 6 *5·9-in.*, 10 *6-pr.*, 1 *1-pr.*	2 sub.	16·5	300	—	287

All the ships are now rated as coast-defence battleships, with the exception of the Fylgia. Older coast-defence ships Oden, Thor, Niord (1897, 1899, 1899), 3715 tons, 2 9·8-in., 6 4·7-in. guns. Minelayer Clas Fleming, 1800 tons, 4 4·7 in., 20 knots, 100 mines; minesweepers Sökaren, Sveparen, Sprängeren, and others. Torpedo gunboats Jacob Bagge, Oernen, Psilander, 830 tons, 2 4·7-in., 4 2 2-in., 20 knots. Two gunboats, 388, 589 tons. Depôt ships for submarines, Svea, 3300 tons, Blenda, 460 tons. Aircraft depôt ship Dristigheten (1901), 3620 tons.

Reconstruction and modernisation of Gustav V. completed, 1930. Sverige and Drottning-Victoria are also to be reconstructed.

UNITED STATES.—Armoured Ships.

Class.	NAME. Date for Scrapping.	Displacement.	Length. (Extreme.)	Beam.	Draught.	Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost. §	Armour.						Armament.		Speed.	Fuel.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Second-ary.	Guns.	Torpedo Tubes.		Coal. Oil.	
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b.	**Arizona** † . 1937. *See p.* P94.	31,400	608	97	28¾	34,000 B. & W. P. tur. (G.)	New York . (Navy Yard)	1915	1916	1,485,000	14 K.S.	3	..	..	18 K.S.	..	12 *14-in.* (45 cal.), 14 *5-in.*, 8 *3-in.* A.A., 4 *3-pr.*, 2 *1-pr.*, 2 M, 2 L., 1 catapult, 3 aeroplanes	2 (sub.)	21·0	— 2300	1400
b.	**Arkansas** * . 1935. *See p.* P96.	29,040	562	93¼	28½	28,533 P. tur. *t*	Camden, N.J. (N.Y.S.B.Co.)	1911	1912	964,000	11–5 K.S.	3	..	8–6 K.S.	11 K.S	6½	12 *12-in.*, 16 *5-in.*, 8 *3-in.* A.A., 4 *3-pr.*, 2 *1-pr.*, 2 M., 1 catapult, 3 aeroplanes	—	21·0	— 5100	1430
b.	**California** . 1941. *See p.* P91.	32,300	624	97½	30¼	28,500 Tur. (G.)	Mare Island (Navy Yard)	1919	1921	..	14 K.S.	..	..	..	18 K.S.	..	12 *14-in.* (50 cal.), 12 *5-in.*, 8 *5-in.* A.A., 4 *6-pr.*, 2 M., 2 *1-pr.*, 2 catapult, 3 aeroplanes	2 (sub.)	21·5	— 4656	1407
b.	**Colorado**. . 1942. *See p.* P90.	32,600	624	97½	30½	28,900 B. & W. tur.	N.Y.S.B Co.	1921	1923	1,383,000	13½–12 K.S.	..	..	..	18 K.S.	..	8 *16-in.* (45 cal.), 12 *5-in.*, 8 *5-in.* A.A., 4 *6-pr.*, 2 *1-pr.*, 2 M., 1 catapult, 3 aeroplanes	2 (sub.)	21·0	— 4570	1407

b.	**Florida** * ‡ . 1934 *See p.* P97.	24,700	521½	88¼	28½	27,036 B. & W. P. tur.	New York . (Navy Yard)	1910	1911	1,280,000	11	..	10	..	11	5	10 *12-in.*, 12 *5-in.*, 8 *3-in.* A.A., 4 *6-pr.*, 4 M., 1 catapult, 3 aeroplanes.	—	22·1	— 4900	1324
b.	**Idaho** . . 1939 *See p.* P92	32,000	624	97½	30	32,000 B. & W. P. tur. (G.)	Camden, N.J. (N.Y.S.B. Co.)	1917	1919	1,485,000	6–3½ K.S.	3	..	..	18 K.S.	..	12 *14-in.* (50 cal.), 12 *5-in.*, 8 *3-in.* A.A., 4 *3-pr.*, 2 *1-pr.*, 2 M., 2 L., 1 catapult, 3 aeroplanes.	2 (sub.)	21·3	— 3271	1374
A.C.	**Lexington** .	33,000	888	106	30	180,000 tur.electric.	Quincy, Mass.	..	1927	9,000,000	..	..	..	..	..	..	8 *8-in.*, 12 *5-in.* A.A. 4 *6-pr.* Stowage for 72 aircraft. Fitted with a catapult.	..	33	Oil	..
b.	**Maryland** . 1941 *See p.* P90.	32,600	624	97½	30½	28,900 T.	Newport News	1920	1921	1,383,000	13½–12 K.S.	..	..	..	18 K.S.	..	8 *16-in.* (45 cal.), 12 *5-in*, 8 *5-in.* A.A., 4 *6-pr.*, 2 *1-pr.*, 2 M., 2 catapults, 3 aeroplanes.	2 (sub.)	21·1	— 4570	1407
b.	**Mississippi** . 1938 *See p.* P92.	32,000	624	97½	30	32,000 B. & W. Cur. t. (G.)	Newport News	917	1917	1,485,000	14 K.S.	3	..	..	18 K.S.	..	12 *14-in.* (50 cal.), 12 *5-in.*, 8 *3-in.* A.A., 4 *6-pr.*, 2 *1-pr.*, 2 M., 2 catapults, 3 aeroplanes.	2 (sub.)	21·1	— 3271	1374

* See note *, p. 333.

† Being modernised. See note †, p. 333.

‡ To be disposed of in accordance with London Naval Treaty.

§ The sums given in this column are exclusive of the cost of armour and armament according to the system of making appropriations in the estimates.

UNITED STATES.—Armoured Ships—*continued.*

Class.	NAME. DATE FOR SCRAPPING.	Displacement.	Length. (Extreme.)	Beam.	Draught.	Horse Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Fuel.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position.		Guns.	Torpedo Tubes.		Coal. Oil.	
															Heavy Guns.	Second-ary.					
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b.	**Nevada** § . . 1936 *See p.* P93.	27,500	583	95¼	28½	23,312 Y. Cur. tur.	Quincy, Mass. (Fore River)	1914	1916	1,211,342	13½–8 K.S	1½–3	.. K.S.	13½ K.S.	18–16 K.S.	..	10 *14-in.* (45 cal.), 12 *5-in.*, 8 *5-in.* A.A., 4 *6-pr.*, 2 *1-pr.*, 2 M., 2 catapults, 3 aeroplanes	2 (sub.)	20·5	— 2000	1320
b.	**New Mexico** . 1939 *See p.* P92.	32,000	624	97½	30	27,500 B. & W. Electric drive	New York . (Navy Yard)	1917	1918	1,485,000	14 K.S.	3	..	..	18 K.S.	..	12 *14-in.* (50 cal.), 12 *5-in.*, 8 *3-in.* A.A., 4 *6-pr.*, 2 *1-pr.*, 2 M., 1 catapult, 3 aeroplanes	2 (sub.)	21·0	— 3271	1414
b.	**New York** * . 1935 *See p.* P95.	29,600	573	95¼	28½	29,687 B. & W.	New York . (Navy Yard)	1912	1914	1,815,114	12–4 K.S	3	9 K.S.	10 K.S.	14–8 K.S.	6 K.S.	10 *14-in.* (45 cal.), 16 *5-in.*, 8 *3-in.* A.A., 4 *3-pr.*, 2 *1-pr.*, 2 M., 1 catapult, 3 aeroplanes	—	21·5	— 5200	1450
b.	**Oklahoma** § . 1936 *See p.* P93.	27,500	583	95¼	29¾	21,703 B. & W.	New York .	1914	1916	2,200,000	13½–8 K.S.	1½–3	K.S.	13½ K.S.	18–16 K.S.	..	10 *14-in.* (45 cal.), 12 *5-in.*, 8 *5-in.* A.A., 4 *3-pr.*, 2 *1-pr.*, 2 M., 2 catapults, 3 aeroplanes	2 (sub.)	20·6	— 2000	1320
b.	**Pennsylvania** † 1937 *See p.* P94.	31,400	608	97	29¾	31,500 B. & W. Cur. tur.	Newport News	1915	1916	1,485,000	14 K.S.	3	..	..	18 K.S.	..	12 *14-in.* (45 cal.), 14 *5-in.*, 8 *3-in.* A.A., 4 *3-pr.*, 2 *1-pr.*, 2 M.	2 (sub.)	21·0	— 2300	1380
a.c.	**Pittsburg** .	13,680	504	69½	24½	28,600 Nic.	Philadelphia (Cramp)	1903	1905	799,340	6–3½ K.S.	4	5 K.S.	4 K.S.	6 K.S.	5 K.S.	4 *8-in.*, 14 *6-in.*, 10 *3-in.*, 2 *3-in.* A.A., 4 *3-pr.*	2 (sub.)	22·4 *t*	2100 —	898
a c.	**Rochester** .	8,150	384	65	23¼	16,600	Philadelphia (Cramp)	1891	1893	..	4	2½	..	..	6–6½	..	4 *8-in*, 8 *5-in.*, 2 *3-in.* A.A., 2 *3-pr.*	..	21·0	1100 —	662

A.C.	**Saratoga** .	33,000	888	106	30	180,000 tur. electric	N.Y. Ship-building Co.	1925	1927	..	..	.	..	..	..	..	8 *8-in.*, 12 *5-in.* A.A., 4 *6-pr.*, stowage for 72 aircraft. Fitted with a catapult	..	33½	..	..
b.	**Tennessee** * . 1940 *See p.* P91.	32,300	600	97¼	30¼	28,500 T.	New York Navy yard	1919	1920	..	14 K.S.	..	..	..	18 K.S.	..	12 *14-in.* (50 cal.), 12 *5-in.*, 8 *5-in.* A.A., 4 *6-pr.*, 2 *1-pr.*, 2 M., 2 catapults, 3 aeroplanes	2 (sub.)	21·0	— 4656	1407
b.	**Texas** * . 1935 *See p.* P95.	29,600	573	95¼	28½	28,100 B. & W. *t*	Newport News	1912	1914	1,166,000	12–4 K.S.	3	9 K.S.	10 K.S.	14–8 K.S.	6 K.S.	10 *14-in.* (45 cal.), 16 *5-in.*, 8 *3-in.* A.A., 4 *3-pr.*, 2 *1-pr.*, 2 M., 1 catapult, 3 aeroplanes	—	21·0	— 5200	1450
b.	**Utah** * ‡ . 1934 *See p.* P97.	24,700	521½	88¼	28½	28,477 B. & W *t.* P. tur	Camden, N.J.	1909	1911	813,500	11	..	10	..	11	5	10 *12-in.*, 12 *5-in.*, 8 *3-in.* A.A., 4 *3-pr.*, 4 M., 1 catapult, 3 aeroplanes	—	21·0	— 4990	1324
b.	**West Virginia** 1942 *See p.* P90.	32,600	624	97½	30½	28,900 T.	Newport News	1921	1923	1,383,000	13½–12 K.S.	..	..	..	18 K.S.	..	8 *16-in.* (45 cal.), 12 *5-in.*, 8 *5-in.* A.A., 4 *6-pr.*, 2 *1-pr.*, 2 M., 2 catapults, 3 aeroplanes	2 (sub.)	21·0	— 4570	1407
b.	**Wyoming** * ‡ . 1934 *See p.* P96.	28,500	562	93¼	29¾	31,437 B. & W. P. tur. *t*	Philadelphia	1911	1912	963,800	11–9 K.S.	..	..	8–6 K.S.	11 K.S.	8	12 *12-in.*, 16 *5-in.*, 8 *3-in.* A.A., 4 *6-pr.*, 2 *1-pr.*, 2 M., 1 catapult, 3 aeroplanes	—	21·2	— 5109	1430

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* Modernised in 1927. Modernisation included fitting of bulge protection, protection of decks against aerial attack, increased elevation of guns, conversion to oil burning, installation of 3-in. A.A. battery, addition of catapults, alteration to masts.

† Being modernised. Modernisation includes fitting additional protection, reboilering, increasing elevation of turret guns, replacing present anti-aircraft batteries by 5-inch A.A. guns, new masts and new fire control; will be completed in 1931.

§ Modernisation completed 1929.

‡ To be disposed of in accordance with London Naval Treaty. Wyoming to be retained for training purposes in accordance with London Naval Treaty.

UNITED STATES.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length. (Extreme.)	Beam.	Draught	Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost. §	Armour.		Armament.		Speed.	Fuel.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.		Coal. / Oil.	
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
l. c.	No. 32. **New Orleans**		..	..	..	..	N. Y. Navy Yard										
"	No. 33. **Portland**		..	..	..	..	Bethlehem S. B. Co., New York										
"	No. 34. **Astoria**	10,000	..	..	..	..	Puget Sound Navy Yard	..	Bldg.	..	..	..	..	..	32·7	..	..
"	No. 35. **Indianapolis**		..	..	..	..	N. Y. Shipbuilding Co., Camden										
"	No. 36. **Minneapolis**		..	..	..	..	Philadelphia Navy Yard										
"	No. 26. **Northampton**	..	..	..	..	..	Bethlehem, S. B. Corp., Fore River	1929	1930								
"	No. 27. **Chester**	..	..	..	..	..	American Brown Boveri Elec. Corp.	1929	1930								
"	No. 28. **Louisville**	10,000	600	65¼	19½	110,000	Puget Sound Navy Yard	1930	Bldg.	..	..	..	9 *8-in.*, 8 *5-in.* A.A., 2 catapults, 4 seaplanes	6	32·7	..	..
"	No. 29. **Chicago**	..	..	..	..	..	Mare Island Navy Yard	1930	Bldg.	2,280,000							
"	No. 30. **Houston**	..	..	..	..	..	Newport News S. B. & D. D. Co.	1929	1930								
"	No. 31. **Augusta** *See p.* P98.							1930	Bldg.								
"	**Cincinnati** .	7500	555½	55⅓	14¼	90,000	Tacoma, Wash.	1921	1924	Cost and fee	2½ side	..	12 *6-in.*, 4 *3-in.* A.A., 2 *3-pr.*, 2 catapults, 3 aeroplanes	6	34·4	— 1800	450
"	**Concord** . *See p.* P100.						Philadelphia (Cramp)		1923					6	33·5		
"	**Denver** . .	3200	308¾	44	15¾	5300 B.&W.	Philadelphia	1902	1904	212,325	2	..	8 *5-in.*, 1 *3-in.* A.A., 6 *6-pr.*	..	16·8	700 —	303
"	**Detroit** . . *See p.* P100.	7500	555½	55⅛	14¼	90,000	Quincy, Mass. (Bethlehem)	1923	1923	Cost and fee.	2½ side	..	12 *6-in.*, 4 *3-in.* A.A., 2 *3-pr.*, 2 catapults, 3 aeroplanes	6	34·6	— 1800	450
"	**Galveston** . .	3200	309	44	15¾	5073 B. & W.	Richmond, Va.	1903	1905	212,325	2	..	8 *5-in.*, 6 *6-pr.*, 1 *3-in.* A.A.	..	16·4	740 —	330

A.C.	**Langley** ..	12,700	542¼	65¼	19	7160 t	..	1912	1913	..	..	..	4 *5-in.*, 30 aeroplanes, 2 catapults.	—	15	— 2000	410
l. c.	**Marblehead**	7500	555½	55⅓	14¼	90,000	Philadelphia (Cramp)	1923	1924	Cost and fee	2½ side	..	12 *6-in.*, 4 *3-in.* A.A.; 2 *3-pr.*, 2 catapults, 3 aeroplanes.	6	33·7	— 1800	450
„	**Memphis**								1925						33·7		
„	**Milwaukee** *See p.* P100.						Tacoma, Wash.	1921	1923						34.6		
„	**Omaha**	7500	555½	55⅓	14¼	90,000	Tacoma, Wash.	1920	1923	Cost and fee	2½ side	..	12 *6-in.*, 4 *3-in.* A.A.; 2 *3-pr.*, 2 catapults, 3 aeroplanes	6	34·9	— 1800	450
„	**Raleigh**						Quincy, Mass.	1922	1924						34·6		
„	**Richmond** *See p.* P100.						Philadelphia (Cramp)	1921	1923						34 2		
„	**Salt Lake City**	10,000	600	65¼	19½	107,500	American Brown Boveri Electric Corp. New York Navy Yard, New York	1929	1929	..	..	..	10 *8-in.*, 4 *5-in.* A.A., 2 catapults, 6 planes	6	32½	— 3000	620
„	**Pensacola** *See p.* P99.							1929	1930								
„	**Trenton** *See p.* P100.	7500	555½	55⅓	14¼	90,000	Philadelphia (Cramp)	1923	1924	Cost and fee	2½ side	..	12 *6-in.*, 4 *3-in.* A.A., 2 *3-pr.*, 2 catapults, 3 aeroplanes	6	33·7	— 1800	450
A.T.	**Wright**	11,000	448	58	30	6000	Zietgen and Lang New York	1920	1921	..	..	.	2 *5-in.*, 2 *3-in.* A.A., 27 planes	—	15	— 1630	313

§ Prices exclusive of armament.

1 Aircraft carrier, 13,800 tons, 29 knots, authorised.

5 Cruisers authorised, money voted, CL 37 to CL 41.

GUNBOATS.—Tulsa (1923), Asheville (1920), 1575 tons, 12 knots, 3 4-in., 2 3-pr., 2 1-pr., 4 M.; Helena (1897) 1392 tons, 15½ knots, 8 4-in., 4 3-pr.; Sacramento (1914), 1425 tons, 12½ knots, 3 4-in., 2 3-pr., 2 1-pr.; and 7 others used for training purposes.

RIVER GUNBOATS.—Guam (1927), Tutuila (1928), 380 tons, 14 knots, 2 3·3-in., 8 M.; Penguin (1918) 950 tons, 14 knots, 2 3 in. A.A.; Palos, Monocacy (1914), 190 tons, 13¼ knots, 2 6-pr.; Panay, Oahu, 440 tons, 15 knots; Luzon, Mindanao, 575 tons, 16 knots.

MINELAYERS.—Aroostook (1918), 4,950 tons, 20 knots; San Francisco (1890), 4,080 tons, 19 knots, 4 5-in., 4 6-pr., 2 3-in. A.A., 4 1-pr., 300 mines; Baltimore (1889), 4413 tons, 20 knots, 4 5-in., 4 6-pr., 2 3-in. A.A., 2 1-pr., 300 mines; Oglala (1918), 4,950 tons, 20 knots, 1 5-in., 1 3-in. A.A., 350 mines; 14 light mine-layers, *ex*-T.B.D.'s. See Flotilla Tables, p. 361.

MINE-SWEEPERS.—42 in number (1918, 1919), 950 tons, 14 knots.

AIRCRAFT TENDERS.—Patoka (1919), 16,800 tons, 10·9 knots, 2 5-in.; Heron (1918), 950 tons, 14 knots, 2 3-in. A.A.; Jason (1913), 19,250 tons, 14·3 knots, 4 4-in., 27 planes.

DESTROYER TENDERS.—Dobbin, 12,450 tons; Whitney, 12,450 tons; Altair, Denebola, Rigel, Melville, 7,150 tons; Black Hawk, Bridgeport, 11,750 tons.

SUBMARINE TENDERS.—Holland (1926), 11,570 tons, 16 knots, 8 5-in., 4 3-in. A.A., 2 6-pr.; Bushnell, Fulton, Canopus, Camden, Savannah, Beaver, and Argonne.

REPAIR SHIPS.—Medusa (1924), 9,960 tons, 16 knots, 4 5-in., 2 3-in. A.A., 2 6-pr.; Vestal, Prometheus (1909), 12,585 tons, 16 knots, 4 5-in. 27 submarine chasers mounting 1 3-in. gun.

5 Cruisers are projected, CL 42 to CL 46, but no money has yet been voted.

River-gunboat Pigeon is being converted to a submarine salvage vessel.

SHIPS OF THE LESSER NAVIES.

Austria.—Patrol vessels: Neretva, Compo (1918), 130 tons, 16 knots; Fogas (1916), 62 tons, 16 knots, and Pozsony (1918), 130 tons, 16 knots. These vessels have been disarmed and are unserviceable.

Bulgaria.—Under the terms of the naval clauses of the Peace Treaty, Bulgarian warships of all classes, existing or under construction, were surrendered to the Allied and Associated Powers or broken up. All vessels are under the Ministry of Commerce for police and preventive duties; torpedo boats Derzki, Khrabri, Smelyi, and Strogi, two minesweepers and some motor boats of little value.

China.—Cruisers: Chao Ho (Elswick, 1912, 2,600 tons), Ying Jui (Barrow, 1912, 2,750 tons)—two 6-in., two 4-in., two 3-in., six 3-pr., two 1-pr., two torpedo tubes; Hai Yung, Hai Chou, and Hai Chen (Germany, 1897–1898, 2,950 tons)—three 5·9-in., eight 4-in. and smaller, one submerged torpedo tube; Hai Chi (Armstrong's, 1899, 4,300 tons)—two 8-in., ten 4·7 in., twelve 3-pr., ten maxims, five torpedo tubes. Destroyers: Chien Kang, Hsiao An, and Yu Chang, of 390 tons, speed 30 knots, armament: two 3-in., four 3-pr., and two 18-in. T.T. Torpedo boats: Seventeen. Gunboats: Two are under construction. River gunboats: Forty-two. Also several dispatch vessels and torpedo gunboats. There are, in addition, a few gunboats and miscellaneous vessels belonging to the water-police of the Kwang Tung Province. One seaplane carrier, Teuck Sheng, building.

Colombia.—Gunboat Chercinto (1897), 640 tons; four Guardacostas (Yarrow, 1913), 20 tons, and 3 in number 150 tons, 13 knots, two 3-pr. River gunboats, General Nerino and Esperanza, 40 tons. Six revenue cutters building at Thornycroft's. Three gunboats built at Yarrows, Cartagena, Santa Maria, Barranquilla, length 130 feet, speed 16 knots.

Cuba.—Light cruiser, Cuba, 2055 tons, 6000 H.P. 18 knots, two 4-in., four 6-pr., four 3-pr., four 1-pr., 2 M., and the training ship Patria, 1220 tons, 16 knots; also 8 gunboats, Habana, Pinar del Rio, Villas, Matanzas, 80 tons, 12 knots, one 1-pr.; 24 de Febrero, 10 de Octubre, 218 tons, 12 knots, one 3-pr, two 1-pr.; Baire 500 tons, 14 knots, four 3-in., two 3-pr., 1 M. One patrol boat building, 115 tons.

Czecho-Slovakia.—There are two river gunboats for training purposes and four small minelayers.

Ecuador.—The torpedo cruiser Libertador Bolivar (1896), of no fighting value, mine-laying torpedo boat Tarqui, and gunboat Cotopaxi (1884).

Esthonia.—The Navy consists of destroyers Vambola (*ex*-Kapitan Kingsbergen) (1918), 1,260 tons, 35 knots, four 4-in. guns, 2 M., one 2-pr., 9 T.T., 80 mines, and Lennuk (*ex*-Avtroil) (1917), 1,350 tons, 35 knots, five 4-in. guns, 2 M., one 2-pr., 9 T.T., 80 mines. Two mine-layers, two minesweepers, two ice-breakers, and Peipus Lake gunboats Ahti and Tartu. Torpedo boat Sulev (*ex* German A 32) (1917), 243 tons, 26 knots, two 3-in., 2 torpedo tubes; gunboat Laine, river gunboat Mardus. Armoured vessels, 2 in No., 3,850 tons, building at A/B Maskin and Brobyggnads, Abo. Submarines Vetehinen, Vesihiisi, and one in No. building at A/B Maskin and Brobyggnads, Abo, 450 tons, speed 15 knots surface, 9 knots submerged. Submarine Saukko building at Helsingfors.

Finland.—Patrol boats Klas Horn (*ex* Posadnik), Uusimaa, Hämeenmaa, Matti Kurki (*ex* Voevoda), Karjala (*ex* Filin), and Turunmaa (*ex* Orlan); also 2 torpedo boats, S1, S5; 5 C.M.B.'s, and 2 building; 6 ice-breakers, and three minesweepers and several motor launches. Three submarines are building at A/B (Masbin and Brobyggnads), Abo, 450 tons, and an additional submarine, 100 tons, at Skeppsdocka, Helsingsfors.

Hayti.—Four special service vessels, Nord Alexis, 1,230 tons, Veretieres, 270 tons, 17 Decembre, 851 tons, Pacifique, 488 tons.

Hungary.—Patrol vessels: Sopron, Debreczen, 138 tons, four 3-in., 4 M.; Kecskemet, 131 tons, two 3-in., 4 M.; Birago, 59 tons, one 3-in., 2 M.; Szeged, 131 tons, four 3-in., 4 M.; also 12 motor launches.

Latvia.—Gunboat Virsaitis (*ex* German M68), 480 tons, two 3-in., two 6-pr., one 3-in. A.A., one torpedo tube; 1 ice-breaker, Krisjanis Valdemars; 2 submarines, Ronis and Spidola, $\frac{390}{514}$ tons $\frac{\text{surface}}{\text{submerged}}$ displ., launched 1926, completed 1927, $\frac{14\frac{1}{2}}{9\frac{1}{4}}$ knots, one 3-in., 2 M., 6 torpedo tubes, complement 27; 2 minesweepers, Imanta, Viesturs, 225 tons, 14 knots, one 3-in., 4 M., 30 mines, completed in 1926.

Mexico.—Coast defence vessel Anahuac, 3162 tons, 15 knots, two 9·4-in., four 4·7-in., four 6-pr., 2 M., 2 L.; gun-vessels, Tampico and Vera Cruz (Elizabeth Port, New Jersey, 1903); displacement, 980 tons; armament, two 4-in. Q.F., four 6-pr.; 16 knots; fitted to serve as transports for 200 troops, Bravo 1,200 tons; 2,600 I.H.P.; 17 knots (Leghorn, 1904), and Aguas Prieta, 1,200 tons; 1,800 I.H.P.; 15 knots. Training ship Zaragoza, 1,200 tons, 1,300 H.P., 15 knots, five 4·7-in., and one 6-pr. Q.F. Two revenue cutters.

Peru.—Almirante Grau and Coronel Bolognesi, cruisers, 3,200 tons; (Barrow, 1906); two 6-in., eight 3-in., eight maxim; 2 submerged torpedo tubes; 24 knots; converted to oil-burning 1925; also Lima (parent ship for submarines). Gunboat America. Destroyer, Rodriguez, 500 tons. Submarines R1 and R2, built at New London, S. and E. Co., Croton Works, U.S.A., $\frac{576}{682}$ tons, $\frac{14\frac{1}{2}}{10}$ knots, one 3-in., 4 torpedo tubes, completed in 1926. Submarines R3, R4, built at Electric Boat Co. (New London Ship and Eng. Co., Croton, Mass.), completed in 1929, same particulars as R1 and R2. R5 and R6 building by Electric Boat Co. (New London Ship and Eng. Co., Croton, Mass.) Two destroyers are projected.

Poland.—Five *ex*-German torpedo boats for police purposes. Gunboats, Komendant Pilsudski, 350 tons, carrying several small guns, and General Haller, built in Finland. Training ship, Iskra. Monitors, Warszawa, Horodyszcre, Krakow, Wilno, Torun, Pinsk. Two destroyers, Burza, Wicher, completed 1930 at Chantiers Navals Français, 1,515 tons, 33,000 H.P., 33 knots, four 5·1-in., one 2·9-in. A.A., 6 torpedo tubes. Three submarine minelayers built in France, Rys at Ch. Loire, Nantes; Zbik at Ch. Navals Français, Caen; Wilk at Ch. Augustin Normand, Le Havre, completed 1930; $\frac{964}{1230}$ tons, $\frac{1800}{1200}$ H.P., 14 knots surface, 9·5 knots submerged; one 4-in., one 2-pr., 6 torpedo tubes, 40 mines. Six more are projected.

Portugal.—The cruiser Adamastor, 1,760 tons, completed at Leghorn in 1897, reconditioned in 1925, two 4·7-in., four 4·1-in., four 3-pr., 3 maxim, 3 torpedo tubes (14-in.). The minelayer Vulcano was built by Messrs. Thornycroft in 1909. There are other small boats, and one sloop sold out of the British Navy have been added, the Carvalho Araujo (*ex*-Jonquil). There is also the coast defence vessel Vasco da Gama (1876), 3,030 tons, 15·5 knots, mounting two 8-in., one 4-in., one 3-in., six 3-pr., reconstructed 1903. Destroyers Douro, Tamega, Guadiana, and Vouga (1913–24), 700 tons, 11,000 H.P., 30 knots, two torpedo tubes, also four *ex*-Austrian F boats for police duties. Submarines Foca, Golfinho, and Hidra (Laurenti); 260–389 tons, 13–8·5 knots, 2 T.T. Two gunboats built at Lisbon, Damao and Zaire, 400 tons, 700 H.P., 13 knots, two 3-in., two 3-pr., and Diu, of the same class, is building at Lisbon, and there are 9 older ones. Lagos and Faro fishery inspection vessels. Three gunboats are projected.

Rumania.—Two flotilla leaders, Regele Ferdinand and Regina Maria, to Messrs. Thornycroft's design, built at Pattison's Yard, Naples, completed 1930, 1,968 tons, 38 knots. Length 334¾ ft., beam 31½ ft., draught 11¼ ft. Armament, five 4·7 in., three 2-pr. A.A.; two twin torpedo tubes.

One submarine, Delphin, built at Quarnaro, Fiume. Displacement, 640 tons surface, 817 tons submerged; speed 14 knots surface, 9·5 knots submerged.

River Monitors.—Bucovina (1916), 540 tons, 12 knots, two 4·7-in., two 3-pr., two 11-pr. A.A.; Ardeal (1905), 440 tons, 10 knots, two 4·7-in., one 3-pr., one 3·5-in. A.A.; Basarabia (1915), 530 tons, 12 knots, two 4·7-in., two 3-pr., two 11-pr. A.A.; Lascar Catargiu, Ioan Bratianu, Milhail Kogalniceanu, Alexandru Lahovary (1907–08), 670 tons, 13 knots, three 4·7-in., two 3-pr., one 3-in. A.A., 2 M.

Flotilla Leaders.—Marasti, Marasesti (*ex*-Italian Nibbio, Sparviero), completed 1917–18, 1,460 tons, 35 knots, five 4·7-in., four 3-in. A.A., 2 M., 2 twin torpedo tubes, 50 mines.

Seven vedettes, 50 tons.

Gunboats.—Stihi, Lepri Remus, Dumitrescu, Ghiculescu, completed 1916–17, 350 tons, 15 knots, two 3·9-in., 2 M. These are *ex*-French vessels.

There are also five armed motor boats, several police craft (*ex*-Austrian T.B.D.'s, Naluca, Sborul, Zmeul), and armed launches.

A submarine depôt ship, Constanta, 2264 tons, is building at Cantiere Navali de Quarnavo, Fiume. Launched 1928.

Siam.—The gunboats Ratnakosindr, 1925, 920 tons, two 6-in., four 3-in. H.A., 12 knots; Bali and Sugrib, 580 tons, 11·5 knots, one 4·7-in., five 6-pr., 2 M.; Muratha, 530 tons, 11·4 knots, one 4·7-in., four 6-pr., 3 M.; and Mongkut, 700 tons, 11 knots, two 4·7-in., two 6-pr., three 3-pr., launched 1898, 1901, 1898, and 1887 respectively. One river gunboat, built at Vickers-Armstrongs', Barrow, the Sukhodaya, completed 1930, 1,030 tons, 13 knots, two 6-in., four 3-in. A.A. One despatch vessel, Pi Sua Nam, 195 tons. Two 380-ton, 27-knot destroyers, built at Kobe, Sua Gamron Sindhu and Sua Tayanchou. Phra Ruan (*ex*-British destroyer Radiant, 1917), 4 torpedo boats. One coastal motor boat, 2 torpedo tubes (18-in.). Training ship Chao Phra (1919), 840 tons, 16 knots.

Turkey.—The old battleship Torghud Reis (*ex*-German Weissenburg, 1891), refitted 1927, 9,900 tons, 17 knots, six 11-in., three 15-pr., two 2·5-in. A.A., 2 submerged torpedo tubes. The battle-cruiser Yavouz Sultan Selim (*ex*-Goeben), 24,000 tons, 25 knots. Armament: ten 11-in., twelve 5·9-in., twelve 22-pr., 2 M., 1 L., 4 submerged torpedo tubes. Light cruisers: Hamidieh (Elswick, 1904), 3,830 tons, speed 22 knots, armament: two 5·9-in., four 3-in., four 3-pr., 2 torpedo tubes; Medjidieh (Philadelphia, 1903), refitted 1927, 3,300 tons, speed 22 knots, armament: four 5·1-in., four 3-in., 4 M. Destroyers, three; torpedo boats, four; and several gunboats, minelayers, and yachts. Two destroyers building at Messrs. Ansaldo, Italy, 1430 tons, and two at Cantiere Navale del Tirreno, Italy. Submarines Ikindji-in-Uni and Birindjiin-Uni, completed 1928, at Fijenoord Works, Rotterdam, $\frac{433}{556}$ tons, $\frac{13\frac{3}{4}}{9\frac{3}{4}}$ knots, one 3-in., 1 M., 6 torpedo tubes. Two submarines, Sakarya and Dumlupinar, building at Monfalcone, 567 tons surface displacement.

Uruguay.—Light cruiser Monte Video, torpedo-gunboat Uruguay, built at the Vulcan Yard, Stettin; 1400 tons; two 4·7-in., four 3-in., six 1-pr., four Maxims; two 18-in. torpedo tubes. Surveying ships Baron de Rio Branco, Zapican, Charrua, built in Germany. Two destroyers and 3 torpedo boats are projected, but no money has been voted for them.

Venezuela.—Gunboats Marescal Sucre (*ex*-Spanish Isla de Cuba), drill ship bought from United States, 1912. General Salom, Miranda. Armed tug José Felix Ribas. Transport Antonio Diaz.

Yugoslavia.—Submarines Hrabri, Nebojsca, completed at Armstrong's 1928, displacement 975 tons surface, 1,164 tons submerged; speed 15¾ knots surface, 10 knots submerged; mount two 4-in., 6 torpedo tubes. Smeli, Osvetnik, completed at Nantes, 1929; displacement 620 tons surface, 797 tons submerged, speed 14·5 knots surface, 9·25 knots submerged, carry one 4-in., one 2-pr., and 6 torpedo tubes. Two coastal motor boats, built at Thornycroft's, completed in 1927. Old cruiser Dalmacija (*ex*-German Niobe), refitted 1926, 2600 tons, is used as a gunnery and general training ship. There are four *ex*-Austrian river monitors, Vardar, Drava, Sava, Morava, 430–600 tons, mounting two 4·7-in.; eleven *ex*-Austrian T.B.D.'s, two patrol boats, six mine-layers, four mine-sweepers (*ex*-Austrian T.B.D.'s), five transports, one training ship, one submarine depôt ship, and auxiliary craft.

One flotilla leader building at Yarrow's, laid down Feb. 15, 1930, displacement 2,400 tons, speed 37 knots, carries four 5·5-in., 2 twin 2-pr., 2 triple torpedo tubes.

BRITISH AND FOREIGN FLOTILLAS.

Great Britain.

Name or Number.	Built by.	Completed.	Dimensions.			Number of Screws.	Standard Displacement. (Wash. Treaty.)	Horse-Power.	Mean Speed on Trial, or expected.	Armament.	Torpedo Tubes.	Complement (War).	Fuel Capacity. Oil.
			Length (Extreme).	Beam.	Draught.								
			FLOTILLA LEADERS.										
			ft. ins.	ft. ins.	ft. ins.		Tons.		Knots.				Tons.
Kempenfelt	Vickers-Armstr'g.	Bldg.	..	..	..	..	..	..	..	..	..	..	..
Keith	J. S. White	Bldg.	323 0	32 3	8 6	2	1330	34,000	35	3 4·7 in., 2 2-prs.	2 Q.	..	380
Codrington	Swan Hunter	1930	343 0	33 9	10 0	2	1520	39,000	35	5 4·7-in., 2 2-prs., 1 M., 4 L.	2 Q.	..	425
Abdiel	Cammell Laird	1916	325	31 9	11 3	3	1310	36,000	34	3 4-in., 1 2-pr., 1 M., 4 L., Mine-layer.	2 D.	130 to 140	515
Grenville	" "	1916								4 4-in., 2-pr., 1 M., 4 L.			
Saumarez													
Shakespeare	Thornycroft	1917	329	31 11	12 4	2	1480	40,000	36	5 4·7-in. 1 3-in. A.A. 2 2-pr. A.A. 1 M., 4 L.	2 T.	182	500
Spenser	"	1917											
Wallace	"	1919											
Keppel	"	1925											
Broke, *ex*-Rooke	"	1925											
Bruce	Cammell Laird	1918	332 6	31 9	12 3	2	1530	40,000	36·5	5 4·7-in. 1 3-in. A.A. 2 2-pr. A.A. 1 M., 4 L.	2 T.	182	500
Douglas		1918											
Campbell		1918											
Mackay, *ex*-Claverhouse		1919											
Malcolm		1919											
Montrose	Hawthorn Leslie	1918											
Stuart	" "	1918											

1 Flotilla leader, named Duncan, is authorised for commencement in 1931 at Portsmouth.

DESTROYERS.

Name or Number.	Built by.	Completed.	Dimensions.			Number of Screws.	Standard Displacement. (Wash. Treaty.)	Horse-Power.	Mean Speed on Trial, or expected.	Armament.	Torpedo Tubes.	Complement (War).	Fuel Capacity. Oil.
			Length. (Extreme.)	Beam.	Draught.								
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Crusader	Portsmouth Dockyard	Bldg.	..	..	..	..	..	..	..	..	..	..	..
Comet													
Cygnet	Vickers-Armstrongs												
Crescent													
Basilisk	Brown	Bldg.	323	32¼	8½	2	1330	34,000	35	4 4·7in., 2 2-pr.	2 Q.	..	380
Beagle	"												
Blanche	Hawthorn, Leslie												
Boadicea	" "												
Boreas	Palmers												
Brazen	"												
Brilliant	Swan, Hunter												
Bulldog	" "												
Acasta	Brown	1930	323	32¼	8¼	2	1330	34,000	35	4 4·7-in., 2 2-pr., 1 M., 4 L.	2 Q.	..	380
Achates	Brown	1930											
Acheron		Bldg.											
Active	Hawthorn Leslie	1930											
Antelope	Hawthorn Leslie	1930											
Anthony	Scotts	1930											
Ardent	Scotts	1930											
Arrow	Vickers Armstr.	1930											
Amazon (*T*)	Thornycroft	1927	323	31¼	9	2	1330	42,270	37·96	4 4·7-in., 2 2-pr.	2 T.	140	433
Ambuscade (*Y*)	Yarrow	1927	322	31	8¼	2	1210	32,850	37·19	4 4·7-in., 2 2-pr.	2 T.	14	385
Admiralty "S" Class:													
Sabre	Stephen	1918	276	26¾	10¾	2	905	27,000	36	3 4-in., 1 2-pr., 1 M., 4 L.	2 D.	98	301
Shamrock	Doxford	1919											
Saladin	Stephen	1919											
Sardonyx	"	1919											
Tactician	Beardmore	1918											
Tara	"	1918	276	26¾	10¾	2	905	27,000	36	3 4-in., 1 2-pr., 1 M., 4 L.	2 S.	98	301

Torpedo tubes: S. = single. D. = double. T. = triple. Q. = quadruple.
T. = Thornycroft design. *Y.* = Yarrow design.

Great Britain—*continued.*

Name or Number.	Built by.	Completed.	Dimensions.			Number of Screws.	Standard Displacement. (Wash. Treaty).	Horse-Power.	Mean Speed on Trial, or expected.	Armament.	Torpedo Tubes.	Complement (War).	Fuel Capacity. Oil.
			Length (extreme).	Beam.	Draught.								
DESTROYERS— *Admiralty "S" Class—contd.*			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Scimitar	Brown	1918	276	26¾	10⅝	2	905	27,000	36	3 4-in., 1 2-pr., 1 M., 4 L.	2 D.	98	301
Scythe	,,	1918											
Seabear	,,	1918											
Seafire	,,	1918											
Searcher	,,	1918											
Seawolf	,,	1918											
Sepoy	Denny	1918											
Seraph	,,	1918											
Serapis	,,	1919											
Serene	,,	1919											
Sesame	,,	1919											
Sirdar	Fairfield	1918											
Somme	,,	1918											
Steadfast	Palmer	1919											
Sterling	,,	1919											
Spindrift	Fairfield	1919											
Turbulent	Haw. Leslie	1919											
Tenedos	,,	1919											
Thanet	,,	1919											
Thracian	,,	1922											
Stormcloud	Palmer	1920											
Strenuous	Scott	1919											
Stronghold	,,	1919											
Sturdy	Scott	1919											
Sportive	Swan Hunter	1918											
Sparrowhawk	,, ,,	1918											
Splendid	,, ,,	1918											
Simoom	Brown	1918											
Swallow	Scott	1918											
Tilbury	Swan Hunter	1918											
Tintagel	,, ,,	1918											
Turquoise (*Y*)	Yarrow	1919	273½	25¾	9⅝	2	750	23,000	36	3 4-in., 1 2-pr., 1 M., 4 L.	2 D.	98	256
Tuscan (*Y*)	,,	1919											
Tribune	J. S. White	1918	276	26¾	10⅝	2	905	27,000	36	3 4-in, 1 2-pr., 1 M., 4 L.	2 D.	98	301
Trinidad	,, ,,	1918											
Trojan	,, ,,	1918											
Truant	,, ,,	1919											
Trusty	,, ,,	1919											
Tourmaline (*T*)	Thornycroft	1919	275¾	27½	10½	2	905	29,000	36				
Senator	Denny	1918	276	26¾	10⅝	2	905	27,000	36				
Shark	Swan Hunter	1918											
Scout	Brown	1918											
Scotsman	,,	1918											
Shikari	Doxford Chatham	1924	276¼	26¾	10⅝	2	905	27,000	36				
Admiralty "V" Class:													
Vansittart	Beardmore	1919	312	29½	10⅝	2	1120	27,000	34	4 4·7 in., 2 2-pr., 1 M., 4 L.	2 T.	130	367
Venomous	Brown	1919											353
Verity	,,	1919											363
Volunteer	Denny	1919											370
Veteran	Brown	1919											363
Wanderer	Fairfield	1919											367
Witch (*T.*)	Thornycroft Devonport	1925	312	30¼	10·9	2	1140	30,000	35				365
Wishart (*T*)	Thornycroft	1920											374
Wren	Yarrow	1923	312	29½	10⅝	2	1120	27,000	34				370
Whitshed	Swan Hunter	1919											368
Wild Swan	,, ,,	1919											368
Witherington	J. S. White	1919											365
Wivern	,, ,,	1919											365
Wolverine	,, ,,	1920											365
Worcester	,, ,,	1922											365
Whitehall	Swan Hunter Chatham	1925											365
Walpole	Doxford	1918	312	29½	10⅔	2	1100	27,000	34	4 4in., 1 2-pr., 1 M., 4 L.	2 T.	120	367
Whitley	,,	1918											
Waterhen	Palmer	1918											
Wryneck	,,	1918											
Windsor	Scott	1918											
Wrestler	Swan Hunter	1918											

Y = Yarrow design. *T* = Thornycroft design.

Great Britain—*continued.*

Name or Number.	Built by.	Completed.	Dimensions. Length. (Extreme)	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Standards Displacement. (Wash. Treaty.)	Horse-Power.	Mean Speed on Trial, or expected.	Armament.	Torpedo Tubes.	Complement (War).	Fuel. Oil.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
DESTROYERS—													
Admiralty "V" Class—contd.													
Woolston (*T*)	Thornycroft	1918	312	30½	10¼	2	1120	30,000	35	4 4-in., 1 2-pr., 1 M., 4 L.	2 T.	120	374
Wolsey (*T*)	,,	1918											374
Wessex	Haw. Leslie	1918	312	29½	10·7	2	1100	27,000	34				369
Winchester	J. S. White	1918	312	29½	10·7	2	1100	27,000	34				369
Wolfhound	Fairfield	1918	312	29½	10·7	2	1100	27,000	34				369
Westminster	Scott	1918	312	29½	10·7	2	1100	27,000	34				367
Westcott	Denny	1918											
Wakeful	Brown	1917											
Walker	Denny	1918											
Walrus	Fairfield	1918											
Warwick	Haw. Leslie	1918											
Watchman	Brown	1918											
Whirlwind	Swan, Hunter	1918											
Winchelsea	J. S. White	1918											
Vanessa	Beardmore	1918											
Vanity	,,	1918											
Voyager	Stephen	1918											
Vidette	,,	1918											
Vivien	Yarrow	1918											
Valhalla	C. Laird	1917	312	29½	10⅝	2	1090	27,000	34	4 4-in., 1 2-pr., 1 M., 4 L.	2 T.	120	369
Valentine	,,	1917											
Valkyrie	Denny	1917											
Valorous	,,	1917											
Vampire	J. S. White	1917											
Vimy (*late* Vancouver)	Beardmore	1918	312	29½	10⅝	2	1090	27,000	34	4 4-in., 1 2-pr., 1 M., 4 L.	1 T. 1 D.	120	370
Vanoc	Brown	1917								4 4-in., 1 2-pr. A.A., 1 M., 4 L.	2 T.		
Vanquisher	,,	1917	312	29½	10·7	2	1090	27,000	34	4 4-in., 1 2-pr., 1 M., 4 L.	2 T.		
Vectis	J. S. White	1917											
Vega	Doxford	1917											
Velox	,,	1918									1 T.,		
Vendetta	Fairfield	1917									2 T.		
Venetia	,,	1917											
Venturous	Denny	1917											
Verdun	Haw. Leslie	1917											
Versatile	,,	1918	..	..	..	..	..	..	..		1 T., 1 D.		
Vesper	Stephen	1918								4 4-in., 1 2-pr., 1 M., 4 L.	2 T.		
Viceroy (*T*)	Thornycroft	1918	312	30½	10¾	2	1120	30,000	35				
Viscount (*T*)	,,	1918											
Vimiera	Swan Hunter	1917	312	29½	10⅔	2	1090	27,000	34				
Violent	,, ,,	1917	312	29½	10⅔	2	1090	27,000	34				
Vivacious	Yarrow	1917											
Vortigern	J. S. White	1918									1 T. 1 D.		
Admiralty "R" Class;													
Tempest	Fairfield	1917	275½	26⅝	10⅔	2	900	27,000	36	3 4-in., 1 2-pr., 1 M., 4 L.	2 D.	98	296½
Tetrarch	H. & Wolff	1917	275¾	26⅔	10⅔	2							
Thisbe	Haw. Leslie	1917	275½	26¾	10⅔	2							
Thruster	,,	1917											
Torrid	Swan Hunter	1917	275¾	26¾	10⅔								
Tyrant (*Y*)	Yarrow	1917	271½	25¾	9½	2	760	23,000	36		2 D.	98	300 (*Y*) 256 (*T*) 285
Teazer (*T*)	Thornycroft	1917	276¼	27	10½	2	905	29,000	35				
Skate	Brown	1917	276	26¾	10⅔	2	900	27,000	36				
Rowena	,,	1916	275½	26¾	10⅔								
Restless	,,	1916											
Salmon	H. & Wolff	1916	275¾	26¾	10⅔								

8 Destroyers, "Defender" class, named Defender, Daring, Diamond, Delight, Dainty, Diana, Duchess, and Decoy, are authorised for commencement in 1931, to be built in private shipyards.

Great Britain—*continued*.

SUBMARINES.

Name or Number.	Where Built.	Completed.	Dimensions.			No. of Screws.	Displacement.	Horse-Power.	Maximum Speed.	Armament.	Torpedo Tubes.	Complement (War).	Fuel Capacity Oil.
			Length. (Extreme)	Beam.	Draught.								
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Swordfish	Chatham ..	Bldg.	..	..	..	..	..	..	..	..	..	..	..
Sturgeon													
Thames	Vickers-Armstrong												
Rainbow	Chatham ..	Bldg.	290	..	..	..	1,475 2,010	..	..	..	..	55	..
Regent ..	Vickers-Armstrong												
Regulus													
Rover ..													
Parthian	Chatham ..	1930	..	..	..	..	1,475 2,040	..	..	..	..	..	..
Perseus	Vickers-Armstrong ..		290	..	..	..	1,475 2,040	..	17-17½ 9	1 4-in.	8	..	..
Poseidon													
Proteus													
Pandora													
Phœnix	Cammell Laird												
Odin ..	Chatham ..	1929	283½	29·8	14·3	..	1,475 2,030	4,400 1,320	17-17½ 9	1 4-in.	8	53	174
Olympus	Beardmore ..	1930				..							
Orpheus	Beardmore ..	1930				..							
Osiris ..	Vickers ..	1929							..	..	..	..	..
Oswald	Vickers ..												
Otus ..	Vickers ..					..							
Oberon	Chatham ..	1927	270	28	13·5	..	1,380 1,800	2950 1350	15 9	1 4-in.	8	52	200
X1 ..	Chatham ..	1925	363½	29·8	15·7	..	2,525 3,600	7,000 2,600	19½ 9	4 5·2 in..2 Lewis	6	100	450
R4 ..	Chatham ..	1919	163	15·5	11·6	..	420 500	240 1,200	9½ 15	1 L.	6	23	23
M3 (late K20)	Armstrong ..	1920	303	24·5	15·75	..	1,600 1,950	2,400 1,600	15½ 9½	4 L.	4	68	110
M2 (late K19)	Vickers ..	1920	296	24·5	15·75	..	1,600 1,950	2,400 1,600	15½ 9½	1 3-in., 2 Lewis	4	70	110
L71 ..	Scott's ..	1920	235	23·5	13·2	..	870 1,150	2,400 1,600	17½ 10½	2 4-in., 1 Lewis	6	44	110
L69 ..	Beardmore ..	1923											
L56 ..	Fairfield ..	1919								1 4-in., 1 Lewis			
L54 ..	Denny ..	1924											
L53 ..	Armstrong ..	1925								2 4-in., 1 Lewis			
L52 ..	Armstrong ..	1921											
L33 ..	Swan Hunter	1919	238½	23½	11·7	..	800 1,080	2,400 1,600	17½ 10½	1 4-in., 1 Lewis	4	41	76
L27 ..	Vickers ..	1926											
L26 ..	Vickers ..	1926											
L25 ..	Vickers ..	1920											
L23 ..	Vickers ..	1924											
L22 ..	Vickers ..	1921											
L21 ..	Vickers ..	1920											
L20 ..	Vickers ..	1919											
L19 ..	Vickers ..	1919											
L18 ..	Vickers ..	1919											
L17 ..	Vickers ..	1918								1 Lewis, 16 mines	4	41	
L16 ..	Fairfield ..	1918								1 4-in., 1 Lewis	4	41	
L15 ..	Fairfield ..	1918									4	41	
L14 ..	Vickers ..	1918								1 Lewis, 16 mines	4	41	
L12 ..	Vickers ..	1918								1 4-in., 1 Lewis	6	41	
L11 ..	Vickers ..	1918									6	41	
K26 ..	Vickers ..	1923	351½	28	16·8	..	2,140 2,770	10,000 1,400	23½ 9	3 4-in., 2 Lewis	10	58	300
H50 ..	Beardmore ..	1920	171	15·75	13	..	440 500	480 320	13 10½	1 Lewis	4	23	16
H49 ..	Beardmore ..	1919											
H48 ..	Beardmore ..	1919											
H44 ..	Armstrong ..	1920											
H43 ..	Armstrong ..	1919											
H34 ..	Cammell Laird	1919											
H33 ..	Cammell Laird	1919											
H32 ..	Vickers ..	1919											
H31 ..	Vickers ..	1919											
H30 ..	Vickers ..	1918											
H28 ..	Vickers ..	1918											
H27 ..	Vickers ..	1913											
H24 ..	Vickers ..	1918											
H23 ..	Vickers ..	1918											

2 submarines, named Starfish and Seahorse, are authorised for commencement in 1931 at Chatham.
1 minelaying submarine, named Porpoise, is authorised for commencement in 1931 at a private shipyard.

Great Britain—*continued.*

SLOOPS.

NAME.	Displacement.	Length (extreme).	Beam (extreme).	Draught.	Horse-Power.	Where built.	Maker of Machinery.	Date of Launch.	Date of Completion.	Armament.	Speed (knots).	Coal. / Oil.	Complement.
SLOOPS.		ft. ins.	ft. ins.	ft. ins.									
Bideford .	1105	281 4	35 0	8 0	2,000	Devonport	..	..	Bldg.	1 4-in., 1 4-in. A.A.	16½	— / 290	..
Rochester						Chatham							
Hastings .	1040*	250 p.p.	34 1	9 1	2,000	Devonport	Devonport	1930	1930	1 4-in., 1 4-in. A.A.	16-16½	— / 280	..
Penzance .						Devonport	Devonport	1930					
Folkestone						Swan, Hunter	Hawthorn, Leslie	1930					
Scarborough						Swan, Hunter	Hawthorn, Leslie	1930					
Fowey	1105	281 4	35 0	8 0	2,000	Devonport	..	..	Bldg.	1 4-in., 1 4-in. A.A.	16½	— / 290	..
Shoreham						Chatham	..						
Bridgewater	945	266 4	34 0	8 6	2,000	Hawthorn Leslie	Hawthorn Leslie	1928	1929	1 4-in., 1 4-in. A.A., 4 L.	17	— / 275	95
Sandwich													
Harebell .	1290	274 9	35 0	12 0	2,500	Barclay Curle	Barclay Curle	1918	1918	2 4-in. 2 12-pr., 2 L.	16·5	320 / —	115
Chrysanthemum .	1290	276 0	35 0	13 3	2,500	Armstrong	Wallsend Slipway	1917	1918	2 3-pr.	16·5	260 / —	100
Bryony .	1290	275 3	35 0	12 10	2,500	Armstrong	Wallsend Slipway	1917	1917	4 3-pr., 1 M. 8 L.	16·5	260 / —	70
Heather .	1250	277 9	33 6	11 10	2,500	Greenock & Grangemouth	Cooper & Greig	1916	1916	1 4-in.	16·5	260 / —	100
Cornflower	1250	267 9	33 6	12 10	2,000	Barclay Curle	Barclay Curle	1916	1916	2 4-in., 4 3-pr. A.A., 2 M., 8 L.	16·5	255 / —	100
Cyclamen .	1250	267 9	33 6	11 9	2,000	Lobnitz	Lobnitz	1915	1916	2 4-in., 4 3-pr. A.A., 2 2-pr., 8 L.	16·5	255 / —	100
Delphinium	1250	267 9	33 6	12 4	2,000	Napier & Miller	Dunsmuir & Jackson	1915	1916	2 4-in., 4 3-pr. 1 2-pr., 2 M., 8 L.	16·5	255 / —	118
Godetia .	1250	267 9	33 6	12 0	2,000	C. Connell	Rowan	1916	1916	1 4-in., 1 12-pr. 2 L.	16·5	255 / —	100
Lupin .						Simons	Simons	1916	1916	2 4-in., 4 3-pr., 1 2-pr., 8 L.		— / 182	
Rosemary						Richardson Duck	Blair	1915	1916	1 4-in., 2 2-pr. 2 M., 8 L.		260 / —	
Snapdragon	1250	267 9	33 6	12 9	2,000	Ropner	Blair	1915	1916	2 4-in., 4 3-pr. 2 2-pr., 8 L.	16·5	255 / —	100
Verbena .						Blyth Co.	Richardson's, Westgarth						
Wallflower						Irvines	Do.						
Wistaria .						Do.	Do.						
Clematis .	1200	262 6	33 0	12 3	1,800	Greenock & Grangemouth	Kincaid	1915	1915	2 4-in., 4 3-pr. A.A., 2 M., 8 L.	16·5	250 / —	100
Heliotrope						Lobnitz	Lobnitz			1 4-in., 2 2-pr., 2 M., 8 L.			
Daffodil .	1200	262 6	33 0	12 6	1,800	Scott's	Scott's	1915	1915	2 4-in., 4 3-pr. 1 2-pr., 2 M., 8 L.	16·5	250 / —	100
Magnolia .										2 4-in., 4 3-pr., 2 2-pr., 2 M., 8 L.			
Laburnum						Connell	Rowan			2 4-in., 4 3-pr. 2 2-pr., 8 L.			
Veronica .						Dunlop Bremner	Dunlop Bremner						
Dahlia .										1 4-in., 2 2-pr., 2 M., 8 L.			
Foxglove .										2 4-in., 4 3-pr., 2 2-pr., 2 M., 8 L.			

4 sloops, "Shoreham" class, are authorised for commencement in 1931; Falmouth, Milford, and Weston-super-Mare to be constructed at Devonport, and Dundee at Chatham.

* Standard displacement.

Great Britain—*continued.*

TWIN-SCREW MINESWEEPERS, RIVER GUNBOATS.

NAME.	Displacement.	Length (extreme).	Beam (extreme).	Draught.	Horse-Power.	Where built.	Maker of Machinery.	Date of Launch.	Date of Completion.	Armament.	Speed (knots).	Coal. / Oil.	Complement.
TWIN-SCREW MINE-SWEEPERS.													
Aberdare	800	231 0	28 7	9 0	2,200	Ailsa	Ailsa	1918	1918	1 *4-in.*, 1 *12-pr.* A.A.	16	190 / —	75
Abingdon						Ailsa	G. Clark						
Albury						Ailsa	Ailsa	1918	1919				
Alresford						Ailsa	W. H. Allen	1919	1919				
Bagshot						Ardrossan Dry Dock Co.	W. H. Allen	1918	1919				
Derby						Clyde S.B. Co.	Clyde S.B. Co.	1918	1918				
Dundalk						Do.	Do.						
Dunoon						Do.	Do.						
Fermoy						Dundee S.B. Co.	Cooper & Greig	1919	1919				
Fareham						Dunlop, Bremner	Dunlop, Bremner	1918	1918				
Forres						Clyde S.B.Co	G. Clark	1918	1919	—			
Tiverton						Simons	Simons	1918	1918	1 *4-in.*, 1 *12-pr.* A.A.			
Elgin						Do.	Do.						
Caterham						Bow, McLachlan	Bow, McLachlan	1919	1919				
Carstairs						Do.	Do.						
Sutton						McMillan	Yarrow						
Saltash						Murdock & Murray	Do.	1918	1918				
Saltburn						Do.	Do.						
Selkirk						Do.	D. Rowan	1918	1919				
Petersfield						Lobnitz	Lobnitz	1919	1919	1 *4-in.*, 4 *3-pr.*			
Ross						Do.	Do.						
Widness						Napier & Miller	Rowan	1918	1918	1 *4-in.*, 1 *12-pr.* A.A.			
Harrow						Eltringham	Wallsend Slipway						
Huntly						Do.	Eltringham	1919	1919	1 *6-pr.*			
Marazion						Fleming & Ferguson	Fleming & Ferguson						
Lydd						Fairfield	Fairfield	1918	1919	1 *4-in.*, 1 *12-pr.* A.A.			
Stoke						C. Rennoldson	Shields Eng. Co.	1918	1918				
Pangbourne						Lobnitz	Lobnitz						
Tedworth						Simons	Simons	1917	1917	1 *3-in.* A.A.		140 / —	35
RIVER GUN-BOATS.													
Falcon	354	150 0	28 8	4 9	2,250	Yarrow	Yarrow	..	..	1 *4·7*-in., 2 *6*-pr.	15	— / 84	
Gannet	310	185 0	29 0	4 0	2,250	Yarrow	Yarrow	1927	1928	2 *3-in.* A.A., 8 L.	16	— / 60	60
Peterel								1927	1927				
Seamew	262	168 0	27 0	4 0	1,270	Do.	Do.	1928	1928		14	— / 50	60
Tern								1927	1927				
Aphis	645	237 6	36 0	4 6	2,000	Ailsa	Ailsa	1915	1915	2 *6-in.*, 1 *3-in.* A.A., 1 *2-pr.*, 8 L.	14	— / 100	55
Bee						Do.	Do.	1915	1916	1 *6-in.*, 1 *3-in.* A.A., 2 *3-pr.*, 1 *2-pr.*, 8 L.			
Cicala						Barclay Curle	Barclay Curle	1915	1916	2 6-*in.*, 1 *3-in.* A.A., 1 *2-pr.*, 8 L.		35 / 55	
Cockchafer						Do.	Do.	1915	1916	2 *6-in.*, 1 *3-in.* A.A., 8 L.			
Cricket						Do.	Do.	1915	1916	2 *6-in.*, 1 *3-in.* A.A., 1 *2-pr.*, 8 L.			
Gnat						Lobnitz	Lobnitz	1915	1915			— / 100	
Ladybird						Do.	Do.	1915	1916	2 *6-in.*, 1 *3-in.* AA., 1 *2-pr.*, 8 L.			
Mantis						Sunderland S.B. Co.	N.E. Marine	1915	1915	2 *6-in.*, 1 *3-in.* A.A., 1 *2-pr.*, 8 L.		35 / 55	
Moth						Do.	Do.	1915	1916	2 *6-in.*, 1 *3-in.* A.A., 1 *2-pr.*, 8 L.		— / 80	
Scarab						Wood, Skinner	Do.	1915	1915			— / 105	
Tarantula						Do.	Do.	1915	1916			— / 105	
Teal	180	165 0	24 6	2 3	670	Yarrow	Yarrow	1901 1904	1901 1904	2 *6-pr.*, 8 L.	13	35 / —	34
Moorhen													
Widgeon													

Argentine Republic.

Name or Number.	Where Built.	Launched	Dimensions.			Number of Screws.	Displacement.	Horse-Power.	Speed	Armament.	Torpedo Tubes.	Complement.	Fuel.
			Length (Extreme.)	Beam.	Draught.								Coal / Oil
FLOTILLA LEADERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Cervantes (*ex* Spanish Churruca) Juan de Garay (*ex* Spanish Alcala Galiano)	Cartagena ..	1925	331¾	31¾	10½	2	1650	42,000	36	5 4·7 in., 1 3-in. A.A., 4 M.	2 triple	—	— / 540
Mendoza .. La Rioja .. Tucuman ..	J. S. White, Cowes	1928 1929 1929	335	31·8	9 2	2	1520	45,000	36·5	5 4·7 in., 1 3-in. A.A., 2 2-pr., 4 M.	2 triple	—	— / 700
DESTROYERS—													
Catamarca * .. .. Jujuy †	Schichau .. Germania ..	1911	288·7	27	8·6	2	950	18,000	32	3 4-in.	8 4	100	—
Cordoba ° .. .. La Plata †	Shichau .. Germania ..	1910 1911	295	29·5	7·8	..	950	20,000	34·7 *t.*	3 4-in.	8 4	100	—
TORPEDO BOATS—													
Corrientes ‡ .. .. Missiones ‡ .. .. Entre Rios ‡ ..	Yarrow .. Yarrow .. Yarrow ..	1896 1896 1896	190	19·5	8·2	2	340	4,000	27·4 *t.* 26·0 *t.* 26·7 *t.*	1 3-in. 3 6-prs., and 2 1-pr.	3	66	80 / —
SUBMARINES—													
Santa Fe .. .. Salta .. .. .. Santiago del Estero	Tosi Taranto	1930	221½	21¼	13	2	850 / 1080	3,000	17·5 / 9	1 4·7 in.	8	—	—

* Converted to oil-burning, 1927, at Buenos Aires. † Being converted to oil-burning at Buenos Aires.
‡ Paid off. 3 flotilla leaders and 3 submarines are projected.

Brazil.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel.
			Length (Extreme.)	Beam.	Draught.								Coal / Oil
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Para .. .. Amazonas .. .. Piahuy .. .. .. Matto Grosso .. .. Parahyba .. .. .. Rio Grande del Norte Alagoas .. .. .. Santa Catharina .. Parana .. .. .. Sergipe	Yarrow ..	1908 1908 1908 1908 1909 1909 1909 1909 1910 1909	240 p.p.	23·6	10	2	560	7,014 6,898 6,563 7,403 6,700 7,778 7,403 6,982 8,877 8,554	27·25 27·17 27·21 27·16 27·29 27·27 27·25 27·30 28·74 27·60	**2 4-in., 4 3 prs.**	2	75	140 / —
Maranhao	Thornycroft ..	1913	265·3	26·5	10·2	..	934	22,500	31	**3 4-in., 1 2-pr.**	**2 dble.**	..	— / 250
TORPEDO BOATS—													
Goyaz	Yarrow ..	1907	152·5 p.p.	15·3	4·3	3	150	..	26·5	**2–3 prs.**	**2**	..	..
SUBMARINES—													
Humayta	Spezia (Ansaldo Fiat)	1927	282	25·6	15·2	2	1370 / 1850	4,800	18·5 / 10	1 4-in. A.A.	6	55	— / 140
F 1 .. .. F 3 .. .. F 5	Spezia (Fiat)	1913	150	13·6	12	..	250 / 370	800 / 500	13·5 / 8	..	2	..	..

Chile.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Horse-Power.	Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel. Coal Oil
			Length. (Extreme.)	Beam.	Draught.								
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
DESTROYERS—													
Serrano	Thornycroft's	1928	300	29	9·3	2	1090	28,000	35	3 4·7-in., 1 3-in.	2 triple	130	— 340
Orella													
Riquelme													
Hyatt													
Videla													
Aldea													
Almirante Lynch,	White.. ..	1912	320 p.p.	32·6	11·1	3	1850	30,000	31·7	6 4-in. 4 M.	4	190	427 80
Condell..		1913											
Almirante Riveros (*ex*-Faulknor) ..	White ..	1914	320 p.p.	32·6	11	3	1700 to 1740	30,000	31·5	2 4·7-in., 2 4-in., 2 2-pdr. A.A.	4	174	403 83
Almirante Uribe (*ex*-Broke) ..													
Almirante Williams (*ex*-Botha)													
SUBMARINES—													
Capitan Thompson ..	Vickers Armstrong's	1929	275	27·5	14·8	..	1520 1990	..	15 9	1 4-in.	8	..	..
Capitan Simpson ..		1929											
Capitan O'Brien ..		1928	..	..	..	..	..	..	..	..	..	..	..
H 1	Fore River, U.S.A.	1915	150·3	15·75	12·3	..	355 470	480 640	13 11	..	4	22	— 17·5
H 2													
H 3													
H 4													
H 5													
H 6													

3 submarines are projected (no money voted).

Denmark.

Name or Number.	Where built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Horse Power.	Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel. Coal Oil
			Length (Extreme).	Beam.	Draught.								
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
TORPEDO BOATS. FIRST CLASS—													
Laxen	Royal Dockyard, Copenhagen	1930	198·9	19·5	7·4	2	315	6,000	28	2 3-in.	8	—	— 26
Dragen		1929											
Hvalen		1930											
R4. Havkatten †	Royal Dockyard, Copenhagen	1919	126·3	13·9	9	2	108·5	2,000	24·6 *t*.	2 6-pr. A.A.	2	22	15 —
R5. Sælen † ..		1919											
R3. Nordkaperen †		1918											
R2. Makrelen † ..		1918											
S6. Narhvalen * ..		1917											
S5. Havhesten * ..		1917											
S4. Söhunden * ..		1917											
S3. Sölöven * ..		1916											
S2. Stören * ..		1916											
S1. Springeren * ..		1916											
R1. Ormen † ..		1907	124·6	14	8·5	1	105	2,100	26	2 3-pr.	3	21	11 —
P3. Sværdfisken		1913	148·2	16·9	7·5	2	190	3,480	26·2 *t*.	1 3-in.	4	30	28 —
P2. Delfinen ..		1913											
P1. Hvalrossen ..		1913											
O3. Söülven ..	Burmeister, Copenhagen	1911	181·7	18	9·7	2	275	5,000	27·5	2 3-in	5	33	80 —
O2. Flyvefisken		1911											
O1. Söridderen ..	Yarrow & Co.	1911											
N3. Spaekhuggeren	Royal Dock., Copenhagen	1911	184·8	19·1	7·1	2	300	5,000	27·5	2 3-in.	5	34	80 —
N2. Vindhunden													
N1. Tumleren ..	Schichau												
SUBMARINES—													
Daphne. D1 ..	Royal Dockyard, Copenhagen	1926	161	16	8·2	..	305 370	900 400	13·4 7	1 3-in. A.A.	6	18	— 16
Dryaden. D2 ..													
Flora. C3 ..	,,	1919	155·7	14·4	3·8	..	301 369	900 640	14·5 10·5	1 6-pr.	5	17	— 13
Bellona. C2 ..													
Rota. C1 ..	,,	..											
B12. Galathea ..	,,	..	133·3	12·3	8	..	181 231	450 340	13·5 9·8	1 6-pr.	3	12	— 9
Neptun. B11 ..	,,	..											
Triton. B10 ..	,,	1914											
Ran. B9	,,	1915											
Aegir. B8	,,	1914											
Nymfen. A7 ..	,,	1914	127·2	12	7·6	..	161 201	450 275	13·0 9·3	..	2	12	— 8
Najaden. A6 ..	,,	1913											
Havfruen. A2 ..	Whitehead & Co., Fiume	1912											

* Used as minesweepers. † Guard ships.

France.

Name or Number.	Where Built.	Launched.	Dimensions. Length. (Extreme.)	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel. Coal / Oil
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Flotilla Leaders—													
Da 10	Ch. de France Dunkirk	Bldg.	..	..	..	2	2,440	64,000	36	5 5·5-in., 1 3-in. A.A., 4 1-pr. A.A.	7	220	..
Da 11	Ch. de la Loire, Nantes												
Da 12	Ch. de Bretagne, Nantes												
Da 13	Ch. de la Loire, Nantes												
Da 14	Ch. de Penhoet, St. Nazaire												
Da 15	Ch. de la Méditerranée, Havre												
D 4 Aigle	Ch. de France, Dunkirk	1930	433	37	14·8	2	2,440	70,000	36	5 5·5-in., 1 3-in. A.A., 4 1-pr.	6	220	..
D 5 Vautour	Ch. de la Méditerranée, Havre												
D 6 Albatross	Ch. de la Loire, St. Nazaire												
D 7 Gerfaut	Ch. de Bretagne, Nantes												
D 8 Milan	Lorient												
D 9 Epervier													
Valmy	Ch. de Penhoet, St. Nazaire	1928	427	38	15	2	2,646	70,000	39·9 t	5 5·5-in. 4 37 mm. A.A.	6	216	— 650
Verdun	Ch. de la Loire, St. Nazaire	1928							40·1 t				
Vauban	Ch. de France Dunkirk	1930							36				
Lion	Dunkirk	1929	427	39·8	15	2	2,650	70,000	35·5	5 5·5 in., 4 1·5 in. A.A.	6	216	— 650
Bison	Lorient	1928											
Guépard	Lorient	1928											
Chacal	St. Nazaire	1924	416	36	14·8	2	2,360	50,000	35·5	5 5·1-in., 2 3-in. A.A.	6	206	— 530
Jaguar	Lorient Dy.	1923											
Leopard	St. Nazaire	1924											
Lynx	,,	1925											
Panthère	Lorient Dy.	1924											
Tigre	Nantes	1924											
Amiral Sénès, *ex* S. 113	Germany	1917	346·5	33·5	14·8	2	2,380	56,000 t	36·9 t	4 5·9-in., 4 M	2 dbl.	180	— 700
Destroyers—													
Forbin	Ch. de Graville, Le Havre	1928	351·7	32·2	10·2	..	1,470	35,000	34	4 5·1-in., 2 1-pr. A.A.	6	146	— 300
Frondeur	Ch. Navals Français, Caen	1929											
Fougueux	Ch. de Bretagne, Nantes	1928											
Foudroyant	Ch. de Dyle et Bacalon, Bordeaux	1929											
Basque	Maritime	1929											
Bordelais	Bordeaux	1928	351·5	32·2	10·2	..	1,470	35,000	34	4 5·1 in., 2 1-pr. A.A.	6	146	— 300
Boulonnais	Caen	1927											
Brestois	Nantes	1927											
L'Adroit	Dunkirk	1927											
L'Alcyon	Bordeaux	1926											
Le Fortune	Caen												
Le Mars	Caen												
La Palme	Nantes												
La Railleuse	Nantes												
Bourrasque	Dunkerque	1925	346½	31·7	10·2	2	1,430	33,000	33	4 5·1-in., 1 3-in. A.A., 2 1·7-in. torpedo tubes.	6	140	— 350
Cyclone	Havre	1925											
Mistral													
Orage	Caen	1924											
Ouragon													
Simoun	St. Nazaire	1924											
Sirocco	Rouen												
Tempête	Nantes	1925											
Tramontane	Bordeaux	1924											
Trombe	Harfleur												
Typhon	Bordeaux	1925											
Tornade	Barcelona	1925											
Glaive	Rochefort	1908	197·4	22·4	11·8	2	358	6,800	27·90	1 9-pr. 4 3-prs.	1	70	85 —
Trident	Rochefort	1907	221·0	21·5	11·5	2	344	6,800	28	1 9-pr., 4 3-pr.	1	70	85 —
*Com. Rivière, *Dehorter	Normand, &c.	1912	197·4	25·4	10·0	3	780	14,500	31	2 3·9-in., 4 9-prs.	4	84	— 140
*Bisson *Protet, *Comm. Lucas, *Mangini	Toulon, etc.	1912 & 1913	257·5	25·5	10·0	3	787–817	16,000	31	2 3·9-in., 4 9-prs.	2 dbl.	84	

* Fitted as mine-sweeper. † Fitted as mine-layer.

6 additional flotilla leaders, Da 16–Da 21, of 2,570 tons displacement, are authorised for commencement in 1931.

France—*continued*.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel. Coal/Oil
			Length. (Extreme.)	Beam.	Draught.								
DESTROYERS—*Contd.*			Feet.	Feet.	Feet.		Tons.		Knots.				Tons
Ens. Roux, M. P. Lestin	Rochefort ..	1915	271	27	10·5	2	925	17,000	30	2 3·9-in., 1 3-in., 4 9 pr.	2 dbl.	98	—/206
Ens. Gabolde	Havre	1921	271	26·9	10·0	2	940	20,000	32·5	3 3·9-in.	4	98	—/200
Rageot-de-la Zouch, *ex*-H. 146 .. .. Delage, *ex*-H. 147 ..	Germany ..	1917	266	27·4	10·0	2	1,019	23,800	33·3 *t*	3 4-in., 1 1-pr., 4 M., 40 mines.	6	111	—/295
Buino, *ex*-V. 30 .. .. Pierre Durand, *ex*-V. 70	Germany .. Germany ..	1917 1915	269	27·2	10·0	2	1,053	20,150	30·5	3 4·1-in., 2 M.	6	113	—/295
Deligny, *ex*-S. 139 .. Chastang, *ex*-S. 133 .. Vesco, *ex*-S. 134 .. Mazare, *ex*-S 135 ..	Germany .. Germany .. Germany .. Germany ..	1917	272·3	27·3	11·5	2	984	24,000	33·7 *t*	3 4·1-in., 4 M.	6	113	—/246
Matelot Leblanc, *ex* Dukla	Fiume .	1916	277·5	25·7	11·0	2	910	17,000	32·5	2 3·9-in., 6 smaller.	4	120	108/152
Téméraire, Intrépide, Opiniâtre, Aventurier	Nantes ..	1911	290·5	28·5	11·5	..	1080	18,000	32	4 3·9-in. 1 3-pr. A.A.	4	102	236/74
Annamite, Algérien, Arabe, Bambara, Hova, Kabyle, Marocain, Sakalave, Sénégalais, Somali, Tonkinois, Touareg ..	Japan	1917	272	24	10·5	..	770	10,060	29	1 4·7-in., 4 3-in.	2 dbl.	106	98/115
Bouclier	..	1912	237	24·7	9	..	710	14,000	35	2 3·9-in. 4 9-pr. 1 3-in. A.A.	4	..	..
Aspirant Herber ..	..		221	21·5	9	..	500	7,500	28	6 9-pr.	3	..	..
Seven 1st class torpedo boats (1905–7), 98 tons, 14–17 knots.													
							Surf./Sub.	Surf./Sub.	Surf./Sub.				
CRUISER SUBMARINES— Surcouf	Cherbourg ..	1929	393·7	29·5	..	2	2,880/4,300	..	18/11	2 8-in.	14	..	..
SUBMARINES, 1st Cl													
Q 167 .. .. Q 168 .. .. Q 169 .. .. Q 170 .. .. Q 171 .. .. Q 172	Cherbourg Cherbourg Brest .. Brest	Bldg.	302	26·8	15·5	2	1380/1970	6000/—	17/—	1 5·5-in. 1 1·5-in. A.A.	11	..	..
Q 153 Promethée .. Q 154 Persée .. .. Q 155 Protée .. .. Q 156 Pégase .. .. Q 157 Phénix	Cherbourg .. Ch. Navals Français, Caen Forge et Ch. de la Mediterranée la Seyne Ch. de la Loire, St. Nazaire Ch. Dubigeon, Nantes	1930	301·8	26·8	15·5	..	1380/1970	6000/2000	18/10	..	..	..	..
Achille .. .. .. Ajax .. .. .. Acheron .. .. Argo .. .. .. Acteon	Brest .. .. Ch. de la Loire, St. Nazaire Ch. Dubigeon, Nantes	1929	302	26·8	15·5	..	1535/1968	6000/2000	18/10	1 3·9-in, 1 1·5-in. A.A.	10	..	—/96
Pascal .. .. .. Pasteur .. .. Poncelet .. .. Henri Poincare .. Archimede .. .. .. Fresnel .. .. .. Monge	Brest .. .. Lorient .. Caen .. .. Ch. de Penhoet, St. Nazaire Ch. de la Mediterranée, la Seyne	1928 1928 1929	302·5	26·8	15·5	..	1535/1968	6000/2000	18/10	1 3·9-in. 1 1·5-in. A.A.	10	..	—/96
*Q 158 .. .. .. *Q 173 .. .. .. *Nautilus .. .. *Saphir .. .. *Turquoise	Toulon	1930 Bldg. 1928 1929 1929	216·5	23·3	13·5	2	747/910	1300/1000	12/9	1 3-in., 64 mines	6	..	..
Redoubtable .. Vengeur	Cherbourg ..	1928	302·5	30·5	15·5	2	1535/1968	6000	18/10	1 3·9-in. A.A. 1 1·5-in. A.A. 1 seaplane in Redoubtable	11	..	—/96
Requin .. .. .. Morse .. .. .. Narval .. .. .. Souffleur .. .. Caiman .. .. Dauphin .. .. Espadon .. .. Marsouin .. .. Phoque	Cherbourg .. Toulon .. Brest	1924 1925 1925 1924 1927 1925 1926 1924 1926	278·8	22·5	15	2	974/1415	2900/1800	16/10	1 3·9-in. A.A.	10	54	..

France—*continued.*

Number and Name.	Where Built.	Launched.	Dimensions. Length. (Extreme.)	 Beam.	 Draught.	Number of Screws.	Displacement. Surf./Sub.	Horse-Power.	Maximum Trial Speed. Surf./Sub.	Armament.	Torpedo Tubes.	Complement.	Fuel. Coal/Oil
SUBMARINES—*Contd.*			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Orphée (Q. 163) ..	Ch. Normand, Havre	Bldg.	..	..	..	..	570/790	1300/—	13·7/—	1 3-in., A.A.	8	..	..
Oréade (Q. 164) ..													
Orion (Q. 165) ..													
Ondine (Q. 166) ..													
Q. 174	..	Bldg.											
Q. 175													
Q. 176													
Q. 177													
Amphithrite	Ch. de la Seine Maritime, Le Trait	Bldg.	2.64	16·2	12·7	2	760/790	1300/—	14/9·2	1 3-in. A.A.	8	..	..
Antiope	Chantiers Normand, Havre	Bldg.											
Atalante	Schneider et Cie Chalons-sur-Saone	1930											
Amazone	Ch. de la Seine Maritime, Le Trait	Bldg.											
Diane	Chantiers Normand, Havre	1930											
Meduse		1930											
Argonaute	Schneider et Cie Chalons-sur-Saone	1929											
Arethuse		1929											
Ariane	Havre	1925	216·5	16	12·8	2	600–766	1200– 1000	14/9	1 3·9-in. A.A.	7	40	..
Danaé		1927											
Eurydice		1927											
Circé	Chalons ..	1925	204·5	17·5	12·8	2	590–765	1250– 1000	14/9	1 3·9-in. A.A.	7	40	..
Calypso		1926											
Doris		1927											
Thetis		1927											
Naïde	St. Nazaire	1925	210	17	12·8	2	590–750	1300– 1000	14/9	1 3·9-in. A.A.	7	39	..
Sirène		1925											
Nymphe		1926											
Galatée..		1925											
Amphitrite	Rochefort ..	1914	177	17·7	10·9	2	413-597	1300– 700	14/7·8	1 3-in.	8	30	—/13
Atalante	Toulon ..	1913											
Néréide	Cherbourg ..	1914	243	19·8	12·3	2	840–1070	2900– 1500	14/12	1 3-in. ..	8	40	—/56
Bellone, Hermione, Gorgone	Rochefort .. Toulon ..	1914 & 1915	198·9	17·7	11·9	2	562-783	1800– 800	15·5/10	1–3-in. ..	8	40	—/14
Gustave Zédé	Cherbourg ..	1913	243	19·7	12·3	..	840-1080	2400– 1500	16/10	1 3-in. ..	8	47	—/68
Daphne..	Cherbourg ..	1915	223	18·0	12·0	2	703-882	1800– 1500	15/11	1 3-in. ..	10	43	—/58
Joessel, Fulton	Cherbourg ..	1917	243	20·0	13·4	2	915–1200	2900– 1650	16½/11	2 3-in. ..	8	47	—/118
Laplace	Rochefort ..	1917	246	21·0	13·0	2	925–1307	2600– 1640	17/11	2 3-in. ..	8	47	—/90
Lagrange	Toulon ..	1917											
Romazzotti, Regnault	Toulon ..	1918											
Armide	Schneider ..	1915	184·6	17·0	10	2	420-665	2200– 900	17·4/10	..	6	29	—/27
O'Bryne, Henry Fournier,	Chalons ..	1919	172	15·6	9·6	..	335-502	1020– 460	14/8	1 3-pr. ..	4	24	—/10
Dupuy de Lôme, Sané	Chalons ..	1916 1915	246	20·9	13·7	..	837-1270	2400– 1660	18/11	2 3-in. ..	8	40	—/99
*Pierre Chailley.. ..	Havre	1922	229·7	24·7	13·0	..	886-1181	1800– 1400	13·5/9	1 3·9-in., 2 M 40 mines	4	43	—/54
*Maurice Callot.. ..	Bordeaux ..	1921	247·8	22	11·8	..	920–1270	2900– 1640	16½/10	1 3-in., 40 mines	6	48	—/44
Pierre Marrast (ex-U. 162) .. .. .. Jean Roulier (ex-U.166)	,, ..	1918	235	21	12·7	2	860-1030	2400– 1200	16/8·5	1 4-in., 1 M.	6	48	—/98
Halbronn (ex-U. 139)	,, ..	1918	302·2	30	15·5	2	2030-2516	3300– 1780	13·6/7·7	1 M.	6	80	—/443
Jean Autric (ex-U.105) Leon Mignot (ex-U.108)	,, ..	1917	234·5	21	12·5	..	835–1038	2400– 1200	16·5/8·5	1 4 1-in., 1 M.	6	48	—/81
Jean Corre (ex-U.B. 155) .. .. Carissan (ex-U.B. 99) Trinité Schillemans (ex-U.B. 94)	,, ..	1917 1918	182·5	19	12	..	520-640	1100– 760	12/7·5	1 4·1-in., 1 M.	5	34	—/74
*René Audry .. .. (ex-U. 119)	,, ..	1917	267·5	24	14	..	1181-1525	2400– 1200	14·5/7·2	1 5·9-in., 1 M 42 mines	4	54	—/213
*Victor Réveille .. (ex-U. 79)	,, ..	1916	193	19·5	16	..	797-877	1300– 800	10/8	1 4·1-in., 1 M. 36 mines	2	40	—/64

French submarines are now divided into two classes :—1st class : All vessels of 850 tons and above in the surface condition including the U minelayers. 2nd class : All smaller vessels.

6 1st class submarines are authorised for commencement in 1931. 4 2nd class submarines are authorised for commencement in 1931. 1 mine-laying submarine is authorised for commencement in 1931. * Mine-laying submarines.

Germany.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Horse-Power.	Designed Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel.
			Length. (Extreme.)	Beam.	Draught.								Coal/Oil
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
W 109. Iltis	Wilhelmshaven	1937	304	28¼	8¾	..	800	23,000	34	3 4·1-in.	6	..	..
W 110. Wolf		1927											
W 111. Tiger		1928											
W 112. Luchs ..													
W 113. Jaguar ..													
W 114. Leopard ..													
W 103. Seeadler ..	Wilhelmshaven	1926	287¾	27¼	10	..	787	23,000	32	3 4·1-in.	6	115	—/300
Greif		1926											
W 105. Albatross ..		1926											
W 106. Kondor ..		1926											
W 107. Falke ..		1926											
Möwe	Wilhelmsh'n	1926	295·5	27¼	9·2	..	785	23,000	32	3 4·1-in.	6	115	—/300
S. 23	Shichau Elbing	1913	234·6	24·6	10	..	620	15,000	32·5	2 4·1-in., 7 M.	2	90	132/55
S. 19		1912								2 4·1-in., 2 M.			
S. 18		1912								2 4·1-in., 7 M			
G. 11	Germania Works, Kiel	1911–1912	233	25	10	..	650	15,000	32·5	2 4·1-in., 7 M.	2	90	140/60
G. 10													
G. 8													
G. 7													
T. 196	Kiel	1911											
T. 190	Vulcan Works, Stettin	1910	243	26	10·5	..	787	16,000	32·5	2 4·1-in., 2 M.	2	98	160/54
T. 185			242·5	26	10·5	..	718	16,000	32·5	2 4·1-in., 2 M.	2	98	148/40

7 torpedo boats (1907–8), 664 tons, 30 knots, 2 22-prs., 6 have 1 twin torpedo tube and 1 has 2 twin torpedo tubes.

Greece.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel.
			Length. (Extreme.)	Beam.	Draught.								Coal/Oil
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
2 in number ..	Odero, Genoa	Bldg.	310	30·0	11·0	..	1334	..	40	4 4·7 in., 4 2-pr. A.A.	2 triple		
2 in number ..													
Thyella	Yarrow ..	1906	220	20·6	9·0	2	350	6000	31·79	2 3-in., 4 6-pr.	2	70	80/—
Sphendoni									31·84				
Lonchi									32·53				
Niki	Stettin (Vulcan)	1906	220	20·6	9·0	2	350	6000	30	2 3-in., 4 6-pr., 2 6-pr. A.A.	2	70	80/—
Aspis													
Velos													
†Aetos, †Leon, †Panther, †Ierax ..	Birkenhead	1911	293	27·7	9·6	..	980	19,750	32	4 4-in., 1 3-in. A.A.	6	110	—/260
SUBMARINES—							Surf./Sub.		Surf./Sub.				
Katsonis	Schneiders, Harfleur	1926	203¾	17·7	12·3	..	593/760	1300/1000	14/9·5	1 4-in., 1 2-pr. A.A.	6	30	..
Papanicolis	Ch. de la Loire, Nantes												
Nereus	Ch. de la Loire, Nantes	1927	223¾	18¾	12·6	2	718/945	1970/1200	14/9·5	1 4-in., 1 2-pr. A.A.	8	45	..
Proteus		1927											
Triton		1928											
Glaucos	Ch. de France, Caen	1928											

Six 125-ton torpedo-boats built by the Vulcan Co. at Stettin: Arethusa, Doris, Aigli, Dafni, Alkyonis, Thetis, 25 knots.
The surrendered Austrian torpedo-boats: Pergamos, Kios, Proussa, Kyzikos and Kydonia, 250 tons, have been added to the Greek Navy for police duties.
Two coastal motorboats are building at Ernesto Breda, Venice, 35 tons displacement.
† Reconstructed by Messrs. J. S. White & Co., Cowes, 1924–25.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Standard Displacement. (Wash. Treaty.)	Horse-Power.	Maximum Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel. Coal. / Oil.
			Length. (Extreme.)	Beam.	Draught.								
Flotilla Leaders—			Feet.	Feet.	Feet.		Tons		Knots				Tons.
Dardo .. .. .. Strale .. .. .. Freccia .. .. .. Saetta	Odero, Sestri Pozente Cant. Navale di Tirreno, Sestri Levante	1930	311	30	11	..	1334	..	38	4 4·7-in.	6	..	..
U. Vivaldi .. .. A. Usodimare ..	Genoa (Odero)	1929 1929	351 p.p.	33·3	17	..	1630	50,000	38	6 4·7-in. 6 2-pr.	6	200	— 500
L. Tarigo .. .. L. Malocello	Genoa (Ansaldo)	1928 1929											
L. Pancaldo .. .. A. Da Noli	Riva Trigoso (Cant. Navali)	1929 1929											
E. Pessagno .. .. N. Da Recco	Ancona (Cant. Navali)	1929 1929	..	..	..	..	..	..	41·5 *t.*	..	..	.	..
N. Zeno .. .. .. G. Da Verazzano .. A. Cadamosto .. A. Pigafetta	Fiume ..	1928 1928 1929 1929											
Leone* .. .. .. Pantera* .. .. .. Tigere*	Ansaldo ..	1923 1924 1924	359·3 p.p.	34·3	11·5	..	1525	42,000	34	8 4·7-in. twins, 2 3-in. A.A., 60 mines.	2 triple	210	— 350
Aquila*	Pattison ..	1916	310	31	10·8	..	1407	40,000	35	4 4·7-in. twins, 2 3-in. A.A., 50 mines	2 dbl. 18-in.	140	— 260
Falco*	Pattison ..	1916	310	31	10·8	..	1407	40,000	35	5 4·7 in. (2 twins and 1 single), 4 3-in. A.A., 50 mines.	2 dbl. 18-in.	140	— 260
Premuda* .. .. (*ex*-German V116)	.. .. ..	1918	347·8	34	14·2	..	2165	54,000	33	4 5·9 in., 2 2-pr. A.A.	2 dbl. 19·7in.	..	— 720
Augusto Riboty* .. Carlo Mirabello* ..	Ansaldo ..	1915 1914	331·3 p.p.	32·2	9·8	..	1285 1382	35,000	35	8 4-in., 4 2-pr. A.A., 100 mines.	2 dbl. 18-in.	150	— 344
Cesare Rossarol,* *ex*-German B97 ..	Hamburg	1915	321½	30·6	9·5	2	744	40,000	36	3 4·7-in., 2 3-in. A.A. 24 mines	4	..	— 526
Destroyers—													
4 in No. (Nembo class)	..	Bldg.	..	..	..	..	1240	..	..	..	..	..	..
Folgore .. .. .. Lampo	Cantieri Partenopei, Naples	Bldg.	..	..	..	..	1465	..	38	4 4·7 in.	6	..	..
Baleno .. .. .. Fulmine	Quarnaro Yard, Fiume												
Borea .. .. .. Zeffiro .. .. .. Espiro .. .. .. Ostro	Ansaldo, Genoa	1927 1927 1927 1928	311½	30·2	10·6	2	1092	35,000	36	4 4·7-in., 3 2-pr. A.A. 3 M., 52 mines	6	140	— 340
Aquilone .. .. .. Turbine	Odero, Genoa	1927 1927											
Nembo .. .. .. Euro	Genoa Docks Co.	1927 1927											
N. Sauro .. .. .. C. Battisti .. .. F. Nullo .. .. D. Manin	Odero Quanaro, Fiume	1926 1926 1925 1925	295½	30·2	10·5	..	1060	32,000	35	4 4·7-in., 3 2-pr. A.A. 3 M., 52 mines	6	140	— 340
Francesco Crispi .. Giovanni Nicotera Bettino Ricasoli .. Quintino Sella ..	Naples (Pattison)	1925 1926 1926 1925	278·6	28·2	10	2	935	28,000	35	3 4·7-in., 2 2-pr. A.A. 2 M., 40 mines	2 dbl. 2 1-in.	106	— 200
Alessandro Poerio .. Gulielmo Pepe ..	Genoa (Ansaldo)	1914	279	26·3	9·3	2	844	20,000	32	5 4-in., 2 2-pr. A.A.	2 dbl.	100	— 250
Impavido .. .. .. Indomito .. .. .. Insidioso .. .. .. Irriquieto	Naples (Pattison)	1913 1912 1913 1913	239½	24·0	8·4	2	540	13,500	30	5 4-in., 2 2-pr. A.A. 1 M., 10 mines	2	71	— 110
Ardito .. .. .. Ardente	Orlando (Leghorn)	1912	239½	24·0	8·4	2	560	13,800	30	5 4-in., 2 2-pr. A.A 10 mines	2	71	— 110
Giuseppe Sirtori .. Vicenzo Orsini .. Francesco Stocco .. Giovanni Acerbi ..	Genoa (Odero)	1916 1917 1916 1916	237¼	24	9·0	2	670	15,000	30	6 4-in., 4 2-pr. A.A. 2 M.	4	100	— 150
E. Cosenz .. .. Giacomo Medici .. G. La Farina .. .. Nicola Fabrizi .. Angelo Bassini .. Giacinto Carini .. G. La Masa	Genoa (Odero)	1918 1917 1918 1917 1917 1917 1917	237¾	24	9·0	2	635	15,000	30	4 4-in., 2 3-in., 2 M. Carries 10 mines.	4	100	— 150
Fratelli Cairoli .. Antonio Mosto ..	Naples (Pattison)	1914	236	24	8·8	2	615	18,000	30·8	5 4-in., 4 2-pr. A.A. 2 M.	4	71	— 150
Rosolino Pilo .. .. Giuseppe Abba .. Ippolito Nievo .. Simone Schiaffino .. Giuseppe Dezza .. Giuseppe Missori ..	Genoa (Odero)	1915							30				

* Designated scouts in Italian official list of naval vessels.

Italy—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions. Length. (Extreme.)	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Standard Displacement. (Wash. Treaty.)	Horse-Power.	Maximum Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel. Coal / Oil
DESTROYERS—*contd.*			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Gen. A. Cantore .. Gen. A. Chinotto .. Gen. A. Papa .. Gen. A. Cascino .. Gen. M. Prestinari Gen. C. Montanari	Genoa (Odero)	1921 1922	240⅓	24	9·0	2	635	15,500	30	3 4-in., 2 3-in. A.A.	4	100	— / 150
Audace	Yarrow ..	1918	287	27·5	8·3	2	630	21,500	30	7 4-in., 1 2-pr. A.A.., 2 M.	2 dbl.	111	— / 252
Ardimentoso, *ex*-S. 63	Schichau ..	1915	274	27·3	8·6	2	803	23,000	30	3 3·9-in., 2 3-in., 24 mines	4	98	— / 305
Solferino, Palestro S. Martino, Curtatone Confienza, Castelfidardo, Calatafimi, Monzambano ..	Leghorn (Orlando)	1921 1922 1923	269 283½	26·5	8·6	2	860 966	18,000	32	4 4-in., 2 3-in. A.A., 2 M., 24 mines	4 6	..	— / 170
Cortellazzo .. .. Grado .. .. .. Monfalcone .. .. Pola	Danubius *ex*-Austrian	1917 1913	274	25·5	8·2	2	570	17,000	32·5	2 3·9-in. 4 3-in. 2 3-in. A.A. 2 M.	4	102	— / 95
FIRST CLASS TORPEDO BOATS—													
P.N., 7, 9, 12, 33, 34, 35, 38, 41–45, 64, 65, 67, 69–71	Pattison ..	1912 & 1913	139 5	15	5·5	2	116 133	2,700- 3,500	28–29	2 3-in. A.A. 1 smaller	2	..	— / 15
A.S., 29, 52-57 ..	Ansaldo ..												
O.S., 15, 46-51 ..	Odero	1914											
O.L., 58-63	Orlando ..	1916	139·5	15	5·5	2	133 168	2,700- 3,800	27	2 3-in. A.A. 1 smaller	2	..	— / 25
O.L.T., 74, 75 ..	Orlando ..	1920											
SUBMARINES—													
4 ("Ballila" class)	..	Bldg.	..	..	..	..	1300	..	..	..	..	..	..
6	..		..	..	..	..	810	..	..	..	..	..	..
12	..		..	..	..	..	610	..	..	..	..	..	..
Squalo .. .. .. Narvalo .. .. .. Delfino .. .. .. Tricheco	Cantiere Navale, Triestino	1930	212	18·8	15·5	..	866 / —	2,600 / 1,300	16·5 / 9	1 3·9-in.	8	64	..
Argonauta .. .. Fisalia .. .. .. Medusa .. .. .. Jalea.. .. .. .. Jantina .. .. .. Nautilus .. .. .. Salpa	Cantiere Navale, Triestino Odero-Terni, Spezia Tosi, Taranto	Bldg.	..	..	..	..	620 / 778	3,000 / 1,400	16·5 / 9	1 3·9-in.	8	..	..
Santorre Santarosa Ciro Menotti	Ansaldo ..	1929	230	19	15·5	..	870 / 1040	3,000 / 1,400	17·5 / 9	1 4-in.	8	..	..
Fratelli Bandiera .. Luciano Manara ..	Monfalcone	1929											
Luigi Settembrini .. Ruggiero Settimo ..	Taranto ..	1930											
E. Fieramosca ..	Taranto (Tosi)	1930	277	27	16·8	..	1300 / 1707	5,500 / 2,000	19 / 10	1 4·7-in., carries mines	6	..	— / 80
M. Bragadino .. F. Corridoni	Taranto (Tosi)	1929 1930	233	18·6	14	2	768 / 1021	1,500 / 1,500	14 / 8	1 4-in., 24 mines	4	..	— / 41
Ballila .. .. .. A. Sciesa.. .. .. E. Toti .. .. .. D. Millelire	Spezia, Ansaldo	1927 1928 1928 1927	285	25·6	14	..	1300 / 1854	4,800 / 2,200	18·5 / 10	1 4·7-in., 1 smaller	6 21-in.	..	— / 140
V. Pisani.. .. .. M. Colonna .. .. Da. Geneys .. .. G. Bausan	Montfalcone, Trieste	1927 1927 1928 1928	223	18·7	13·8	..	768 / 1034	3000 / 1000	17·5 / 9	1 4-in. 1 M.	6 21-in.	..	— / 48
G. Mameli .. .. P. Capponi .. .. Speri .. .. G. Da. Procida ..	Taranto ..	1926 1927 1928 1928	213·3	21·5	13	..	718 / 977	3000 / 1000	17·5 / 9	1 4-in.	6 21-in	..	— / 48
L. Galvani, E. Torricelli	Spezia.. ..	1918 1917	211·7	20·3	15·6	..	780 / 1224	2,600 / 1,300	17 / 10	2 3-in., 1 M.	6 18-in.	32	— / 50
L. Mocenigo .. .. A. Emo	Venice.. ..	1918 1919											
G. Nani	Spezia, F.I.A.T.	1917	218·0	19·3	14	..	708 / 909	2600 / 1300	17 / 10	2 3-in., 1 M.	6 18-in.	32	— / 60
X 2, 3	Ansaldo ..	1916	139·9	18	11	..	390 / 460	650 / 320	10 / 6·3	1 3 in. A.A. 1 M., 18 mines	2 18-in.	..	— / 8
H 2 to 4, 6 to 8 ..	Vickers ..	1917	150·3	15·8	12	..	336 / 466	500 / 300	12 / 8·9	1 3-in. A.A. 1 M.	4 18-in.	22	— / 18
F 6, 13, 18, 20, 21	F.I.A.T. .. Odero and Orlando ..	1916	149·6	13·8	10	..	242 / 313	700 / 250	14 / 8	1 3-in. A.A. 1 smaller,	2 17·7 in.	22	— / 12
N 1, N 3, N 4	Ansaldo ..	1916	150·5	14	9·9	..	262 / 357	650 / 320	12·5 / 7·5	1 3-in. A.A. 1 M.	2 18-in.		— / 9
N 6	Taranto ..	1917											

Japan

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Horse-Power.	Maximum Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel.
			Length. (Extreme.)	Beam.	Draught.								Coal Oil
DESTROYERS :			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
FIRST CLASS—													
Oboro	Sasebo	Bldg.	368 p.p.	34	10·7	..	1700	40,000	34	6 4·7-in., 2 M.	9	..	..
Akebono	Fujinagata												
Sazanami	Maizuru												
Ushio	Uraga..												
Akatsuki..	Sasebo												
Hibiki	Maizuru												
Ikazuchi	Uraga..												
Inazuma	Fujinagata												
Sagiri	Uraga	1929											
Asagiri	Sasebo	1929											
Yugiri	Maizuru	1930											
Amagiri	Tokyo	1930											
Shikinami	Maizuru	1929											
No. 45. Ayanami ..	Fujinagata	1929											
No. 35. Fubuki ..	Maizuru ..	1927	368 p.p.	34	10·7	..	1700	40,000	34	6 4·7-in., 2 M.	9	210	..
36. Shirayuki ..	Yokosuka ..	1928											
37. Hatsuyuki ..	Maizuru ..	1928											
38. Miyuki	Uraga ..	1928											
39. Murakumo ..	Fujinagata	1928											
40. Shinonome ..	Sasebo.. ..	—											
41. Usugumo	Ishikawa-jima (Tokyo)	1927 1927											
42. Shirakumo ..	Fujinagata..	1927											
43. Isonami ..	Uraga	1927											
44. Uranami ..	Sasebo ..	1928											
28. Minadzuki ..	Uraga	1926	320 p.p.	30	9·8	2	1450	38,500	34	4 4·7-in., 2 M.	8	148	— 400
29. Fumitsuki ..	Fujinagata..	1926											
30. Nagatsuki ..	Ishikawa,ima	1926											
31. Kikudzuki ..	Maizuru ..	1926											
32. Mikadzuki ..	Sasebo.. ..	1926											
33. Mochidzuki ..	Uraga ..	1927											
34. Yudzuki ..	Fujinagata	1927											
11. Oite ..	Uraga	1924, 25	320 p.p.	30	9·7	..	1315	38,500	34	4 4·7-in., 2 M. A.A.	6	148	— 400
23. Yayoi ..													
13. Hayate ..	Ishikawa-jima	1925											
25. Udzuki ..													
17. Yunagi ..	Sasebo.. ..	1924, 25											
19. Mutsuki													
21. Kisaragi ..	Maizura ..	1925											
27. Satsuki	Fujinagata..	1925											
1. Kamikaze	Nagasaki ..	1922	320 p.p.	30	9·6	..	1270	38,500	34	4 4·7-in., 2 M. A.A.	6	..	— 400
3. Asakaze													
5. Harukaze	Maidzura ..	1922–24											
7. Matsukaze													
9. Hatakaze													
15. Asanagi ..	Fujinagata..	1924											
Umikaze, Yamakase	Maizuru and Mitsubishi ..	1910–11	323·3	28·0	9·2	3	1150	20,500	33	2 4·7-in., 5 12-pr.	4	139	250 178
Amatsukaze	Kiobe	1916	325·5	28·0	9·3	3	1227	27,000	34	4 4·7-in., 2 M. A.A.	6	145	145 295
Tokitsukaze	Kure												
Isokaze	Kure												
Hamakaze	Nagasaki ..												
Tanikase	Maizuru ..		336·5	29	9·3	2	1300	34,000	34	3 4·7-in., 2 M.	6	128	— 380
Kawakase	Yokosuka ..												
Sawakase.. .. .. Okikase, Shimakase,	Nagasaki ..	1916–19	336·5	29·25	9·5	2	1215	38,500	34	4 4·7-in. 2 M. A.A.	6	149	— 400
Nadakase. Yukase, Hakase, Minekase	Maidzuru ..												
Namikase, Numakase, Nokase, Tashikase, Shiokase, Hokase. Yakase, Akikase	Mitsubishi, Kawasaki, Maidzuru	1920–2											
SECOND CLASS—													
No. 2, Wakatake	Kawasaki, Kobe	1922	275 p.p.	26·5	8·3	..	820	21,000	31·5	3 4·7-in., 2 M. A.A.	4	110	— 250
4. Kuretake													
16. Fuyo ..	Fujinagata..	1922, 23											
18. Karukaya													
10, Asagao ..	Ishikawa-jima	1922–23											
12. Yugao ..													
6. Sanaye ..	Uraga	1923											
8. Sawarabi													
Sakura, Tachibana..	Maizura ..	1911–12	274	24·0	7·9	3	600	9,500	30	1 4·7-in. 4 3-in.	4	92	126 32
Kaba	Yokosuka ..	1915	274·0	24·0	8·5	2	665	9,500	30	1 4·7 in. 4 3-in.	4	92	90 135
Kaede	Maizuru ..												
Kashiwa	Nagasaki ..												
Katsura	Kure												
Kiri	Uraga												
Kusunoki	Kobe												
Matsu	Nagasaki ..												
Sakaki	Sasebo.. ..												
Sugi	Osaka.. ..												
Ume	Kure												

Six 3rd class destroyers of 375 tons, 6,000 shaft h.p., and 30 knots, carrying 5 3-in. and 2 T.T., fitted as minesweepers.
15–17 destroyers projected for completion before 1936.

Japan—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Horse-Power.	Maximum Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Coal/Oil
			Length (extreme).	Beam.	Draught.								
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
DESTROYERS—*contd.*													
Second class—contd.													
Momo, Yanagi	Sasebo	1916–18	275·0 p.p.	25·3	7·9	2	835	16,000	31·5	3 4·7 in., 2 M.	6	109	92/212
Kashi, Hinoki	Maidzuru												
Nara	Yokosuka												
Kuwa, Tsubaki	Kure												
Maki, Keyaki	Sasebo												
Enoki	Maizuru												
Momi, Kaya	Yokosuka	1917–19	275·5 p.p.	26	8	2	770	21,000	31·5	3 4·7 in., 2 M.	4	110	—/290
Nashi, Kaki, Take	Kawasaki												
Kuri	Kure												
Nire, Tsuga	Ishikawa-jima												
Urakaze	Yarrow	1915	287·3	27·6	9·5	2	810	22,000	28	1 4·7-in., 4 3-in.	4	117	—/248
Hagi	Uraga	1920–1922	275·5 p.p.	26	8	2	850	21,500	31·5	3 4·7 in. 2 M., A.A.	4	80	—/290
Susuki, Yomogi Sumire	Ishikawa-jima												
Hishi, Hasu	Uraga,												
Tade, Fuji	Fujinagata,												
Aoi, Kiku Tsuta, Ashi,	Kawasaki												
SUBMARINES—		Completed					Surf./Sub.						
I5	Kawasaki	Bldg.	..	..	..	..	1955/—	6000/1800	17/9	1 4·7-in.	6	..	..
I65	Kure												
I66	..												
I67	..												
I59	Yokosuka	1929	320½ p.p.	26	16	..	1650/2000	6000/1800	21/7·9	1 4·7 in.	6	56	—/255
I61	Mitsubishi	1929											
I62	Kobe	1928											
I64	Kure	1929											
I57	Kure	1929											
I4	Kawasaki	1929	320 p.p.	30·2	15·7	..	1970/2480	6800/1800	17/9	2 4·7 in. 1 M.	6	61	—/520
I1, I2, I3	Kawasaki	1926											
†I21	..	1927	279½ p.p.	24·6	14	..	1150/1470	2400/1200	16·5/9·5	1 4·7-in.	4	45	..
†I22	Kawasaki	1928											
†I23		1928											
†I24		1928											
I53	Kure	1927	331½ p.p.	26	16	..	1650/2000	6000/1800	21/7-9	1 4·7-in.	8	56	—/255
I55	Kure	1927											
I56	Kure	1929											
I54	Sasebo	1927											
I63	Sasebo	1928											
I60	Sasebo	1929											
I58	Yokusuka	1928											
Ro. 31	Mitsubishi	1927	243½	20	12·4	..	770/1000	2600/1200	17/10	1 4-in.	4	43	—/75
Ro. 65	Mitsubishi	1926	250	24·2	12·4	..	1000/1300	2400/1800	16/10	1 3-in.	6	47	—/75
Ro. 66	Mitsubishi	1927											
Ro. 67	Mitsubishi	1927											
I. 51	Kure	1924	330	25	16·8	..	1400/2000	6000/1800	21/7-9	1 4·7-in.	8	..	—/190
I. 52		1925											
Ro. 64	Mitsubishi	1925	250	24.2	12·4	..	1000/1300	2400/1800	16/10	1 3-in.	6	47	—/75
Ro. 63, 62, 61	Mitsubishi	1924											
Ro. 60	Mitsubishi	1923											
Ro. 32, 30	Kawasaki	1924	243·5	20	12·4	..	770/1000	2600/1200	17/10	1 4·7-in.	4	43	—/75
Ro. 29	Kawasaki	1923											
Ro. 28	Sasebo	1923	230 p.p.	20·1	12	..	750/1000	2600/1200	17/10	1 3-in. 1 3-pr.	4 21-in	..	—/75
Ro. 27	Yokosuka	1924											
Ro. 26	Sasabo	1922											
Ro. 59	..	1923	250	23·5	13	..	900/1082	2400/1600	17/10·5	1 3-in. 1 3-pr.	4 21-in.	65	—/76
Ro. 58, 57	..	1922											
Ro. 25, 19, 18, 17	Sasebo, Kure	1921	230	20	12·2	..	740/990	2600/1200	17/10	1 3-in. 1 3-pr.	6 18-in.	43	—/75
Ro. 24	Sasebo	1920											
Ro. 23	Yokosuka	1923											
22, 21, 20, 16	Yokosuka, Kure	1922											
Ro. 3, 4, 5	Kawasaki	1922	215·2	20	13·5	..	750/950	2600/1200	17/10	1 3-in. 1 3-pr.	5 18-in.	..	—/60
Ro. 56, 55	Mitsubishi	1922	231·5	23·5	13	..	900/1082	2400/1200	17/10·5	1 3-in. 1 3-pr.	6 18-in.	65	—/76
54, 53	Mitsubishi	1921											
52, 51	Mitsubishi	1920											
Ro. 15, 14	Kure	1921	230 p.p.	20	12·3	..	740/986	2600/1200	17/10	1 3-in. 1 3-pr.	6 18-in.	48	..
13	Kure	1920											
Ro. 12, 11	Kure	1919	227 p.p.	21	11·3	..	720/1035	2600/1200	17/10	1 3-in. 1 3-pr.	6 18-in.	..	—/60
Ro. 1, 2	Kawasaki	1920	215·2	20	13·5	..	700/1072	2600/1200	17/10	1 3-in. 1 3-pr.	5 18-in.	..	—/65

Sixteen 750-ton submarines projected for completion before 1936. † Fitted for minelaying.

Netherlands.

Name or Number.	Where built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Horse-power.	Maximum speed.	Armament.	Torpedo Tubes.	Complement.	Fuel.
			Length. (Extreme.)	Beam.	Draught.								Coal. / Oil.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots				Tons.
*Banckert .. *Van Nes .. *Van Galen *Witte de With	Burgerhout Rotterdam Fijenoord Rotterdam	1929 1930 1928 1928	321·5	31	9·8	—	1500	31,000	34	4 4·7-in., 2 3-in. A.A., 4 1-pr., 4 M.	6	130	—/330
*De Ruyter *Evertsen .. *Piet Hein .. *Kortenaer	Flushing Rotterdam	1926 1926 1927 1927	321·5	31	9·8	..	1620	31,000	34	4 4·7-in. 2 3-in. A.A. 24 mines	6 21·in.	126	—/330
*Jakhals, *Lynx, *Panter ..	Flushing Rotterdam	1910–1913	230	22	9	2	510	8,500	30	4 3-in., 4 M.	2	84	108/11
1ST CLASS TORPEDO BOATS—													
*Zeeslang, *Krokodil, *Draak,	Flushing	1907 1906 1906	130	13·8	6·9	1	104	1200–1560	24	2 1-prs.	2	20	20/—
G 13-15-16	Scheldt Fijenoord	1913–1914	162·5	17·3	9·0	..	180	2,600	26	2 3-in.	3	25	40/—
Z 1–4 ..	Amsterdam	1916–1917	201	20·4	6	2	322	5,500	27	2 3-in., 2 M.	4	39	61/8
Z 5–8 ..	Scheldt Fijenoord	1915	192	19·8	5·5	2	310	5,500	27	2 3-in., 2 M.	4	39	70/7
SUBMARINES—							Surf./Sub.						
K XIV .. K XV . K XVI ..	Rotterdam	Bldg.	242	21·5	13·3	..	810/1,000	..	17/9	1 3·5-in., 2 1·5-in.	6	..	..
K XVII .. K XVIII ..	..	Bldg.	..	..	..	..	..	..	..	..	..	..	..
O 12 .. O 13 .. O 14 .. O 15 ..	De Schelde	Bldg.	19·9	18·7	11·5	..	560/700	2,900/—	15/8	2 1·5-in. A.A.	5	..	../—
O 10 ..	Amsterdam	1925	179½	18·7	11½	..	506/627	900/—	12½/9	1 22-pr. A.A. 1 maxim	5	29	21
*K 13 .. *K 12 .. *K 11 ..	Fijenoord	1924	218·8	20·2	12·2	..	660/810	2,400/—	15/8	1 22-pr., 1 maxim	6	31	—/45
O 11.. .. O 9	Fijenoord Flushing	1925 1925	179½	18·7	11½	..	506/627	900/—	12½/9	1 22-pr. A.A., 1 maxim	5	29	—/21
O 8 (*ex*-British H6)	..	1914	150·3	15·8	12·3	..	364/434	480/320	13/8·5	1 maxim	4	26	—/18
M1 (*ex*-German UC 8)	Hamburg	1915	111½	10·3	9	..	157/176	80/155	7½/5	1 4-pr. 12 mines	—	16	—/2½
O 7	Fijenoord	1916	112	12·8	9·5	..	177/206	350/185	11·5/8·5	1 maxim	3	12	—/5·4
O 6	De Schelde	1916	115·9	12·8	9·5	..	187/226	350/185	11·5/8·5				
O 5 .. .. O 4 .. .. O 3 .. .. O 2	De Schelde De Schelde De Schelde De Schelde	1913 1913 1912 1911	105·3	10·2	9·5	..	129/147	300/170	11/8·5	1 maxim	2	10	—/3·6
*K 10 .. *K 9 .. .. *K 8	De Schelde	1923 1922 1922	212	18·3	11·9	..	560/690	1,550/630 1,550/630 1,800/630	15/8	1 22-pr. 1 maxim	4	29	—/45
*K 7 .. .. *K 6 .. .. *K 5	Fijenoord	1921 1920 1919	177·2	16·8	12·5	..	550/630	1,200/600	15/8	1 3-in., 1 maxim	6	29	—/76
*K 4.. .. *K 3	De Schelde	1920 1919	211·3	18·3	11·5	..	560/700	1,200/600 1,800/600	15/8	1 3-in., 1 maxim.	6	29	—/45
*K 2	Fijenoord	1919	172·3	16·8	12·5	..	550/600	1,800/600	15/8	1 3-in., 1 maxim	6	29	—/76

One flotilla leader is projected but no money voted. Two destroyers, Nos. IX and X, are projected but no money voted. Eight submarines, O 16 and O 17, K XIX, K XX, K XXI, K XXII, KXXIII, K XXIV, are projected but no money voted.

* Indian Military Marine.

Norway.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel.
			Length. (Extreme.)	Beam.	Draught.								Coal / Oil
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Destroyers—													
Draug, Troll, Garm	Horten ..	1908–13	226	23·5	8·8	2	540	7,500	27·0	6 3-in. Draug has 6 4·7-in. in addition	3	71	95 / 6
First Class—													
Snogg, Stegg, Trygg	Horten ..	1919–1920	173·9	18	5½	2	220	3,500	25	2 3-in.	4	31	30 / —
Second Class—													
Hval	Elbing ..	1896–1900	130·0	16·0	6·9	1	100	1,100	21	2 1·4-in. Q.F.	2	19	17 / —
Storm, Brand, Troda	Horten ..												
Laks, Sild, Sael, Skrei	Horten ..	1901	126·4	15·0	6·9	1	100	,100	21·8	2 1·4-in.	2	19	
Kjek, Hvas, Kvik, Blink	Fredrikstad	1898	114·5	14·5	6·0	1	73	750	20	2 1·4-in.	2	14	11 / —
Lyn, Hauk, Falk ..	Horten ..	1903											
Skarv, Teist	Horten ..	1906–7	133	14·9	6·5	1	100	1,700	25	2 3-pr.	2	18	16 / —
Lom, Jo, Grib.. ..			117	14·5	5·7	1	72	1,100	23	2 M.	2	16	15 / —
Ravn, Orn	Horten ..	1903	113	14·5	5·7	1	73	850	23	2 M.	2	16	
Kjell	Horten ..	1912	135	14·9	6·4	1	100	1,800	25	2 3-pr.	2	19	15 / 16
Submarines—													
A 2, 3, 4	Germania Kiel	1909 to 1913	133·2	15·7	8·9	2	246 / 332	900 / 380	14 / 7	—	3	17	— / 12·8
B 1, 2	Horten ..	1922	167·3	17·5	10·5	2	413–545	900 / —	14·5 / 10	1 3-in.	4	23	— / 21
B 3, 4	Horten ..	1923–24											
B 5, 6	Horten ..	1929											

3 destroyers (1000 tons), 6 torpedo boats (250 tons), and 10 submarines (500 tons), projected but no money has yet been voted.

Soviet Union.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Horse-Power.	Designed Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel.
			Length. (Extreme.)	Beam.	Draught.								Coal / Oil
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Destroyers—													
Felix Dzerzhinski Khadji Bey (*ex* Kertch).. .. Nezamojnik (*ex* Feodinissi) .. Petroviski .. Nezamojni .. Shaumyan ..	Ship & Eng. Co., Nikolaev	1917	303·5	29·5	10·5	..	1326	29,000	33	4 4-in., 2 7-pr., 4 M., can carry 80 mines	12	120	— / 390
Karl Marx .. Jakov Sverdlov	Revel.. ..	1915	344·5	31·3	9·7	..	1350	32,700	35	4 4-in., 1 2-pr., 2 M., 80 mines	9	110	— / 400
Uuritsky .. .. Volodarski .. Rykov (*ex* Letun)	Leningrad..	1914	321·5	30·5	9·25	..	1610	32,000	35	4 4-in., 1 2-pr., 2 M., 80 mines	9	110	— / 400
Engels .. .. Stalin .. .. Zinoviev .. .. Volkov-Trotsky Lenin .. .. Kalinin		1914–1915	314·75	30·5	9·75	..	1260	30,000	35	4 4-in., 2 M., 1 2-pr., 80 mines	9	110	— / 350
Bezpokoini* .. Gnyevni* .. Derski*	Nikolaev ..	1913–14	307·7	29·5	9	..	1088	25,500	34	3 4-in., 2 3-pr., 4 M.	10	140	— / 260
Pospyeshni* .. Fruuze .. .. Puilki*	Leningrad..	1913–14	321·5	30·5	9·8	..	1100	23,000	34	3 4-in., 2 3-pr., 4 M., 80 mines	10	120	— / 351

* Under French protection.

Soviet Union—*continued.*

Name or Number.	Where Built.	Date of Completion.	Dimensions.			Number of Screws.	Displacement. Surf./Sub.	Horse-Power.	Designed Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel. Coal/Oil
			Length. (Extreme.)	Beam.	Draught.								
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
SUBMARINES—													
Revoluzioner	Nikolaiev ..	Bldg.	..	..	..	..	1,100/—	1,500/1,200	12/—	1 3-in. 1 1-pr.	4	..	..
Yakobinetz													
Spartakovetz	Sevastopol												
Politrabotnik (ex Ag 26)	..	1924	150¼	15¾	5¼	..	355/467	480/320	13/11	1 6-pr.	4	..	..
Marxist (ex Ag 25)	..	1922	150¼	15¾	15¼	..	375/467	480/320	13/11	1 57-mm.			
Kommunist (ex Ag 24)	..	1922											
Shakter (ex-Ag 23), Ag 22*	..	1920								1 4-in., 2 M.	6	..	—/17
Proletary	..	1916	223	14·5	12·5		650/784	2640/900	16/9	1 6-pr., or 2 6-pr., 1 M.	4	33	—/40
Rabotchky	..	1917						2640/900	16/9	42 mines	4	..	
Tyulen*	..	1915	220	14·5	12·7			500/1400	10/11·7	1 4-in., 1 2-in., 2 M.	4	52	—/2
Politruk	..	1913											
Utka*	..	1916	223	14·5	12·5			500/900	10/9	2 11-pr., 1 1-pr., 1 M.	4	52	—/40
Burysevyestnik* ..	..	1918						2640/900	16/9	1 11-pr.	4	..	
Batrak	..	1917	223	14·5	12·6			500/900	10/9	2 6-pr., 1 1-pr., 1 M.	4	33	—/40
Krasnoarmeyets ..	..	1917											
Komissar	..	1916											
Bolshevik	..	1916											
Komunar	..	1916											
Tovaristch	..	1916											
Krasnoflotetz ..	..	1916											

In addition to thè above 10 submarines are building. *** Under French protection.**
There are thirty-five destroyers completed from 1895 to 1912 of very little if any fighting value.
Many of the above vessels are known to be practically useless until very extensively repaired and refitted.

Spain.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Coal/Oil
			Length. (Extreme.)	Beam.	Draught.								
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
FLOTILLA LEADERS—													
3 in No.	Cartagena ..	Bldg.	331¾	31·7	10·5	2	1,650	42,000	36	5 4·7-in. 1 3-in. A.A. 4 M.	6	..	—/540
Churruca (No. 45) ..		1929											
Alcala Galiano (No. 46)		1930											
Lepanto (No. 44) ..		1928											
Almirante Ferrandiz (No. 42)	..	1928											
José Luis Diez (No. 43)	Cartagena ..	1928											
Sanchez-Barcaiztegui	Cartagena ..	1926											
DESTROYERS—													
Alsedo	Cartagena ..	1922	283	27	10·5	2	1,145	33,000	34	3 4-in., 2 2-pr. A.A.	4	70	—/265
Velasco		1923											
Juan Lazaga		1924											
Proserpina*	Clydebank ..	1897	229	22¼	9·9	2	457	7,500	30	2 14-pr. 2 6-pr. 2 1-pr	2	74	90/—
Bustamante*	Cartagena ..	1913–1915	221¼	22¼	5·6	..	364	6,250	28	5 6-pr.	4	70	80/—
Villaamil *	Cartagena ..												
Cadarso*	Cartagena ..												
TORPEDO BOATS—													
22 boats	Cartagena ..	1913–1922	164	16·5	4 9	3	177	3,750	26	3 3-pr.	3	31	33/—
SUBMARINES—													
C 1, C 2, C 3, C 4 ..	Cartagena ..	1928	247	20·8	13·5	..	900/1154	2000/750	16/9	1 4-in., 1 3-in. A.A.	6 21-in	..	..
C5, C 6		1929											
B 1-6	Cartagena ..	1921–24	210	18·9	11·25	..	560/830	1400/850	16/10·5	1 3-in.	4 18-in.	28	—/66
A 1-3	Spezia, Italy	1917	149·6	13·5	10·2	..	260/380	600/450	13/8·5	1 3-pr.	2	18	—/8
Isaac Peral	Fore River Co., U.S.A.	1916	197	19	11	..	488/750	1200/680	15/10	1 3-in. A.A.	4	24	..

12 submarines are authorised (money voted). * Minelayers.
7 flotilla leaders, Nos. 47 to 53, are projected but no money has yet been voted.

Sweden.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel. Coal/Oil
			Length. (Extreme.)	Beam.	Draught.								
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
DESTROYERS—													
Klas Horn	Malmo	1930	303·2	29·2	8·5	..	976	26,000	35	3 4·7-in., 2 40-mm. A.A., 2 M.	2 trpl.	125	—/150
Klas Uggla	Karlskrona	Bldg.											
Nils Ehrensköld ..	Göteborg	1926	293	29·2	10·5	..	1,050	25,000	35	3 4·7-in., 2 40-mm. A.A., 2 M.	2 trpl.	125	—/150
O. H. Nordenskjold	Malmö												
Magne	Thornycroft	1905								2 3-in., 4 6-pr., 2 M.	2 dbl.		
Wale..	Malmo ..	1906											
Ragnar	Malmo ..	1909											
Sigurd	Gothenburg	1909	216	20·8	9	2	455	8,000–9,000	30·0	4 3-in., 2 M.	2 dbl.	67	80/—
Vidar	Malmo ..	1909											
Hugin	Gothenburg	1909											
Munin	Malmo ..	1910											
Wrangel †	Gothenborg	1917	232·8	22	9·2	2	500	12,000	34·0	4 3-in., 2 M.	2 dbl.	72	107/6
Wachtmeister † ..													
TORPEDO-BOATS—													
Castor, Pollux	Normand & Carlskrona	1908								2 1-pr.			
Vega	Carlskrona..	1909											
Vesta													
Spica, Astrea, Iris, Thetis	Bergsund and Gothenburg	1909	128	14·5	8·5	1	120	2,000	25	2 6-prs.	2	18	20/—
Altair													
Antares	Stockholm ..	1908											
Argo													
Arcturus													
Perseus, Polaris ..	Bergsund ..	1910–											
Regulus, Rigel ..	Stockholm ..	1915											
SUBMARINES—													
1st Class—													
Ulven	Naval Yard, Karlskrona	1930	217	21	10·8	..	700/850	..	16/9	..	..	..	..
Draken	Naval Yard, Karlskrona	1926	217	21	10·8	..	500/650	2800/—	15/9	1 4-in., 1 M	4	..	—/40
Gripen		1928											
Bavern													
Illern	Naval Yard, Karlskrona	1921	187	19·4	9·2	..	500/650	2800/—	15/9	1 3-in., 1 M.	4	..	
Uttern													—/33
Delfinen..	Bergsund Co., Stockholm	..	147·7	13·8	9·2	..	800	..	15/9	1 6-pr.	2	..	—/8
Svärdfisken	Kockum Co., Malmo	..	137·7	12·5	9·8	..							
Tumlaren													
Sälen													
Valrossen	Kockum Co., Malmo ..	1920	177·2	16·2	11 2	..	450/580	..	..	1 3-in., 1 M.	4	..	—/23
Hajen													
Minelaying Sub.—													
Valen	..	1925	187 2	23·2	9·4	..	..	..	..	1 3-in., 1 M.	4	..	—/34
2nd Class—													
Aborren			101·7	11·7	10·2	..	..	..	..	..	2	..	—/6·5
Braxen	Karlskrona D.Y... ..	1914–15											
Laxen													
Gäddan			88·6	11·7	10·2	..	..	..	..	..	1	..	—/4·0
No. 3	..	1908–09	139 4	14·8	9·8	..	175/225	1000/200	15/8	..	2	17	..

† Fitted for mine-laying.

Also six small 2nd class torpedo-boats, 60 tons, built 1907–1908.
Two minelaying submarines are projected (no money voted).

United States.

Name or Number.	Where built.	Completed.	Dimensions.			Number of Screws.	Displacement.	Horse-Power.	Maximum Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel.
			Length. (Extreme.)	Beam.	Draught.								Oil.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Pruitt	Bath, I.W.	1920	314·4	31	9·8	..	1,215	27,000	35	4 4-in., 1 14-pr. A.A.	4 triple	122	375
Sicard													
Preble													
William B. Preston	Norfolk, N.W.	1920											
Noa		1921											
Hulbert		1920											
Decatur	Navy Yard, Mare Is.	1922											
Perry		1922											
Trever		1922											
Wasmuth		1921											
Zane		1921											
Litchfield		1920											
Meade	Bethlehem S.B. Co., Squantum	1919											
Swasey													
Tingey													
Morris													
Thornton													
Bailey													
Shubrick													
Ballard													
Greene													
Edwards													
McLanahan													
Laub	Bethlehem S.B. Co., Quincy												
Gillis													
Turner													
Aulick													
Welles													
Bancroft													
Osmond Ingram													
Rodgers													
McCalla													
McCook													
Belknap													
Lawrence	New York S.B. Co.	1920											
Hopkins		1921											
Barry		1920											
Goff		1921											
Bainbridge		1921											
Reuben James		1920											
Williamson													
Sands													
King													
Childs													
Sturtevant													
Overton													
James K. Paulding													
McFarland													
Humphreys													
Kane													
Fox													
Gilmer													
Brooks													
Hatfield													
Paul Jones	Cramp, Pa.	1921											
Truxton		1921											
John D. Ford		1920											
Pillsbury													
Peary													
Pope													
Stewart													
McCormick													
Bulmer													
Simpson													
MacLeish													
Edsall													
Parrott													
Whipple													
J. D. Edwards													
Borie													
Tracy													

United States—*continued.*

Name or Number.	Where built.	Completed.	Dimensions.			Number of Screws.	Displacement.	Horse-Power.	Maximum Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel.
			Length. (Extreme.)	Beam.	Draught.								Oil.
DESTROYERS—*continued.*			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Barker													
Smith Thompson													
Alden													
Broome		1919	..	..	..	..	..	..	..	Long and Hovey have 8 4-in. in twin mtgs. and 1 3-in. A.A.			
Long													
Hovey													
Southard													
Chandler													
Dallas													
Herndon													
Branch		1920	314·4	31	9·8	..	1,215	27,000	35	4 4-in., 1 14-pr. A.A.	4 triple	122	375
George E. Badger													
Welborn C. Wood	Newport News S.B. Co.	1921											
Hunt		1920											
Abel P. Upshur		1920											
Mason		1920											
Satterlee		1919											
Semmes													
Goldsborough		1920											
Dahlgren													
Clemson		..	..	..	..	..	..	..	..	..	..	..	375
Bagley													
Abbot		1919	314·4	31	9·8	..	1,213	27,000	35	4 4-in., 1 14-pr.	4 triple	122	286
Haraden													
Thomas													
Hopewell													
Stansbury		1920											
Howard		1920											
Hogan													
O'Bannon	Union I.W.												
Renshaw													
Mackenzie													
Kalk													
Foote			314·4	31	9·8	..	1,191	27,000	35	4 4-in., 1 14-pr.	4 triple	122	283
Maddox		1919											
Cowell													
Bush	Fore River S.B. Co.												
Meredith													
Crosby													
Walker													
Thatcher													
Palmer		1918											
Herbert													
Schenck	N.Y. S.B. Co.												
Leary			314·4	31	9·8	..	1,211	26,000	35	4 4-in., 1 14-pr.	4 triple	122	286
Dickerson													
J. Fred Talbot													
Cole													
Ellis													
Bernadou		1919											
Dupont													
Biddle													
Blakeley													
Barney	Cramp, Phil.		314·4	31	9·8	..	1,154	26,000	35	4 4-in., 1 14-pr.	4 triple	122	286
Breckenridge													
Roper													
Elliot													
Greer													
Upshur													
Yarnall		1918											
Tarbell													
Hamilton		1919											
Claxton		1919											
Ward	Mare Island, N.Y.	1918											
Kennison		1919											
Kilty		1918											
Boggs		1918	314·4	31	9·5	..	1,154	24,000	35	4 4-in., 1 14-pr.	4 triple	122	286
Tillman		1921											
Crowninshield													
Hale	Bath I.W.												
Aaron Ward													
Buchanan													
Jacob Jones		1919											
Babbitt													
Twiggs	New York S.B. Co.		314·4	31	9·8	..	1,211	26,000	35	4 4-in., 1 14-pr.	4 triple	122	286
Badger													
Tattnall													

United States—*continued.*

Name or Number.	Where built.	Completed.	Dimensions.			Number of Screws.	Displacement.	Horse-Power.	Maximum Speed.	Armament.	Torpedo Tubes	Complement.	Fuel. Oil.
			Length. (Extreme.)	Beam.	Draught.								
DESTROYERS—*continued.*			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Ramsay Gamble Breese Montgomery Radford Lamberton	Newport News S. Co.	1919	314·4	31	9·8	..	1,213	25,000	35	4 4-in., 2 14-pr.	4 triple	122	286
Lea Dorsey Dent Waters Talbot Rathburne	Cramp, Pa.	1918	314·4	31	9·8	..	1,154	26,000	35	4 4-in., 1 14-pr.	4 triple	122	286
Crane Williams Chew Mugford Champlin Schley Bell	Union Plant. Fore River S.B. Co.	1919 1919 1918	314·4	31	9·8	..	1,191	27,000	35	4 4-in., 1 14-pr.	4 triple	122	283
Taylor Fairfax	Mare Island, N.Y.		314·4	31	9·8	..	1,154	24,200	35	4 4-in., 1 14-pr. A.A	4 triple	122	286
Gridley Harding McKean Ringgold Robinson McKee	Union I.W.	1919 1919 1919 1918 1918 1918	314·4	31	9·9	..	1,191	27,000	35	4 4-in., 1 14-pr. A.A.	4 triple	122	286
Stevens Colhoun Dyer Stringham Gregory Sigourney Kimberly Little	Fore River S.B. Co.	1918	314·4	40	9·8	..	1,191	27,000	35	4 4-in., 1 14-pr. A.A	4 triple	122	283
Evans Philip Wickes	Bath I.W.		314·4	40	9·7	..	1,154	24,200	35	4 4-in., 1 14-pr. A.A.	4 triple	122	286
Manley		1917	315·5	30·7	9·5	..	1,125	20,000	32	3 4-in., 1 14-pr. A.A.	4 triple	122	260
Stockton Conner	Cramp Pa.	1917 1918	315·5	30·7	9·5	..	1,125	18,500	30	5 4-in., 1 14-pr. A.A.	4 triple	122	260
Gwin	Seattle D.D. Co.	1920	315·5	30·7	9·5	..	1,125	18,750	30	4 4-in., 1 14-pr. A.A.	4 triple	122	260
Craven	Norfolk, N.Y.	1918	315·5	30·7	9·5	..	1,125	20,000	32	4 4-in., 1 14-pr. A.A.	4 triple	122	260
Caldwell	Mare Island N.W.	1917	315·5	30·7	9·5	..	1,125	20,000	30	4 4-in., 1 14-pr. A.A.	4 triple	122	260
Allen	Bath I.W.	1917	315·3	29·9	9·8	..	1,071	17,500	30	4 4-in., 1 14-pr. A.A.	4 triple	122	290
Rowan Sampson	Fore River S.B. Co.	1916	315·3	29·9	10·7	..	1,111	17,000	29·5	4 4-in., 1 14-pr. A.A.	4 triple	122	290
Wadsworth	Bath I.W.	1915	315·3	29·9	10	..	1,060	17,000	30	4 4-in.	4 dbl.	118	310
Cushing	Fore River S.B. Co.	1915	305·3	30·4	10·5	..	1,090	16,000	29	4 4-in.	4 dbl.	106	308
Winslow Nicholson O'Brien		1915	305·3	30·3	10·5	..	1,050	16,000	29	4 4-in	4 dbl.	106	307
Balch Benham Parker Aylwin	Cramp.	1914 1914 1913 1914	305·3	30·5	10·5	..	1,036	16,000	29·5	4 4-in.	4 dbl.	106	310
Duncan	Fore River S.B. Co.	1913	305·3	30·4	10	..	1,014	16,000	29	4 4-in.	4 dbl.	106	308

In addition to the above there are 21 obsolete destroyers of the Flusser Class, completed 1910–1912. Their displacement is 742 tons, 29·5 knots, carrying 5 or 4 13-pdrs. and 3 double torpedo tubes. Their names are Mayrant, Henley, Jarvis, Beale, Fanning, Jenkins, Jouett, Patterson, Walke, Monaghan, Ammen, Trippe, Warrington, Burrows, McCall, Sterrett, Perkins, Drayton, Terry, Paulding, Roe. Destroyers: 12 projected, Nos. 348–359 (no money voted).

United States—*continued.*

Name or Number.	Where built.	Completed.	Dimensions. Length. (Extreme.)	Beam.	Draught.	Number of Screws.	Displacement.	Horse-Power.	Maximum Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel. Oil.
			Feet.	Feet.	Feet		Tons.		Knots.				Tons.
DESTROYERS NOW FITTED AS MINELAYERS—													
Rizal	Union I.W.	1919	314·4	31	9·8	..	1,191	27,000	35	4 4-in., 1 14-pr. A.A. 92 mines	..	107	283
Sprostan ..		1919											
Anthony ..		1919											
Burns§ ..		1919								3 4-in. 1 14-pr.A.A. 92 mines			
Ludlow§ ..		1918											
Ingraham ..		1919								4 4-in., 1 14-pr. A.A. 92 mines			
Hart		1919											
Lansdale ..	Fore River S.B. Co.	1918								4 4-in., 1 14-pr. A.A. 92 mines			
Luce													
Israel													
Murray ..										3 4-in., 1 14-pr. A.A. 92 mines			
Stribling ..										4 4-in., 1 14-pr. A.A. 92 mines			

Name or Number.	Where built.	Completed.	Dimensions. Length. (Extreme.)	Beam.	Draught.	Number of Screws.	Displacement. Surface. / Submerged.	Horse-Power.	Maximum Speed. Surface. / Submerged.	Armament.	Torpedo Tubes.	Complement.	Fuel. Oil.
			Feet.	Feet.	Feet.		Tons.		Knots				Tons.
SUBMARINES—													
V7	Portsmovth Navy Yard.	Bldg.	..	..	..	..	..	3,550 —	..	..	..	..	..
V8													
V9													
V4	Portsmouth Navy Yard.	1928	380	33·7	—	..	2,890	2,800 —	15 8	2 6-in., 60 mines	4	86	..
V5	Portsmouth Navy Yard.	1930	371	33·3	16	..	2,730 3960	6,000 —	17 —	2 6-In.	6	88	..
V6	Mare Island Navy Yard.												
V3	Portsmouth Navy Yard.	1926	341·5	27·5	15·5	..	2,160 2,520	6,500 —	21 9	1 5-in. 2 maxim	6	87	..
V2		1925											
V1		1924											
S50§	Lake T.B. Co., Bridgeport	1922	240	21·8	13·5	..	990 1,230	1,800 1,500	14·8 11·0	1 4-in.	5	..	148
S49§													
S48													
S47*	Bethlehem Shipbuilding Corp., Quincy Plant	1925	225·3	20·7	16	..	906 1,126	1,200 1,500	14 —	1 4-in.	4	40	154
S46*		1925											
S45*		1925											
S44*		1925											
S43*		1924											
S42*		1924											
S41*	Bethlehem Shipbuilding Corp., Union Plant	1924	219·3	20·7	16	..	854 1,062	1,200 1,500	14·5 11	1 4-in.	4	..	140
S40*		1923											
S39*		1923											
S38*		1923											
S37*		1923											
S36*		1923											
S35*		1923	219·3	20·7	16	..	854 1,062	1,200 1,500	14·5 11	1 4-in.	4	38	140
S34*		1923											
S33*		1923											
S32*		1923											
S31*		1923											
S30*		1920											
S29*	Bethlehem Shipbuilding Corp., Quincy Plant	1924	219·3	20·7	16	..	854 1,062	1,200 1,500	14·5 11	1 4-in.	4	38	140
S28*		1923											
S27*		1924											
S26*		1923											
S25*		1923											
S24*		1923											
S23*		1923											
S22*		1924											
S21*		1923											
S20*		1922											
S19*		1921											
S18*		1923											

* Designed by Electric Boat Co., Groton, Conn.

§ To be disposed of shortly.

United States—*continued.*

Name or Number.	Where built.	Completed.	Dimensions. Length. (Extreme.)	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement. Surface. / Submerged.	Horse-Power.	Maximum Speed. Surface. / Submerged.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots				Tons.
Submarines—*continued.*													
S17	Lake T.B. Co., Bridgeport	1921	231	21·8	13	..	854 1,092	1,000 1,200	13·5 12·3	1 4-in.	4	38	123
S16		1920											
S15		1921											
S14		1921											
S13	Navy Yard, Portsmouth	1923	231	21·8	13	..	876 1,092	2,000 1,200	15·8 12·3	1 4-in.	5	38	123
S12		1923											
S11		1923											
S10		1922											
S9		1921	231	21·8	13	..	876 1,092	1,400 1,200	15 12·3	1 4-in.	4	38	123
S8		1920											
S7		1920											
S6		1920											
S4		1919											
S3		1919											
S2§	Lake T.B. Co.	1920	207	19·6	16·2	..	800 980	1,800 1,210	16 11	1 4-in.	4	38	88
S1*	Fore River S.B. Co.	1920	219·3	20·7	16	..	854 1,062	1,200 1,500	14·5 11	1 4-in., 1 aeroplane	4	38	140
T3* §.. ..	Bethlehem Shipbuilding Corp., Quincy Plant	1920	269·8	22·8	12·8	..	1,110 1,490	4,400 1,520	20 11·5	1 4-in.	6	..	76
T2* §.. ..		1922											
T1* §.. ..		1920											
R20*	Union, I.W.	1918	186·1	18	14·5	..	570 680	880 934	13·5 10·5	1 3-in.	4	30	63
R19*		1918											
R18*		1918											
R17*		1918											
R16*		1918											
R15*		1918											
R14*	Fore River S.B. Co.	1919											
R13*		1919											
R12*		1919											
R11*													
R10*													
R9*													
R8*													
R7*													
R6*													
R5*													
R4*													
R3*													
R2*													
R1*													
O10*	Fore River S.B. Co.	1918	172·3	18	14·4	..	520 630	880 740	14 10·5	1 3-in.	4	30	73
O9*													
O8*													
O7*													
O6*													
O4*													
O3*													
O2*†§ ..	Navy Yard, Puget Sound												
O1*†§ ..	Navy Yard, Portsmouth												
H9*‡§ ..	Navy Yard, Puget Sound	1918	150·3	15·8	12·4	..	358 434	480 600	12¾ 10¼	..	4	26	38
H8*‡§ ..													
H7*‡§ ..													
H6*‡§ ..													
H5*‡§ ..													
H4*‡§ ..													
N3*§	Morento, Seattle	1917	147·3	15·8	12·5	..	348 414	480 560	13 11	..	4	26	20
N2*§													
N1*§													
L11*§ ..	Fore River S.B. Co.	1916	168·5	17·4	13·6	..	450 550	900 680	14 10·5	1 3-in.	4	29	65
L9*§													
L3*§													
L2*§													

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* Designed by Electric Boat Co., Groton, Conn.
† Built under licence from Electric Boat Co.
‡ Built from parts constructed by E.B.Co. for Russian Govt.
§ To be disposed of shortly.

United States—*continued.*

Name or Number.	Where built.	Completed.	Dimensions.			Number of Screws.	Displacement. Surface. / Submerged.	Horse-Power.	Maximum Speed. Surface. / Submerged.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
			Length. Extreme.	Beam.	Draught.								
			Feet.	Feet.	Feet.		Tons.		Knots				Tons.
SUBMARINES—*continued.*													
K8*§	Union I.W., San Francisco	1914	153·5	16·7	13	..	392 520	480 680	14 10·5	..	4	26	57
K7*§													
K6*§	F.R.S. Co.												
K5*§													
K4*§	Moran Co., Seattle, Wash.												
K3*§	Union I.W., San Francisco												
K2*§	F.R.S. Co.												
K1*§													
H3*§	Moran Co., Seattle, Wash.	1914	150·3	15·8	12·4	..	358 434	480 600	14 10·5	..	4	26	32
H2*§	Union I.W., San Francisco	1913											

* Designed by Electric Boat Co., Groton, Conn.

§ To be disposed of shortly

A submarine named Neff is projected.

All submarines older than O1 are termed second-line submarines, suitable only for coast defence.

The machinery contractors for the 78 vessels of the E. B. Co. Design built in yards other than the Navy Yards were the New London Ship and Eng. Co., Groton, Conn., and the hulls were built under sub-contract from the E. B. Co.

TABLES OF COMPARATIVE NAVAL STRENGTH

TABLE I.—EFFECTIVE FIGHTING SHIPS, BUILT AND BUILDING.

Class.	British Empire.			U.S.A.			Japan.			France.			Italy.			Soviet Union.			Germany.		
	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.
Battleships, 14-in. guns and upwards	12	—	12	14	—	14	6	—	6	—	—	—	—	—	—	—	—	—	—	—	—
Battle-cruisers, 14-in. guns and upwards	3	—	3	—	—	—	4	—	4	—	—	—	—	—	—	—	—	—	—	—	—
Battleships, smaller guns	3	—	3	4	—	4	—	—	—	9	—	9	4	—	4	5	—	5	7	1	8
Battle-cruisers, smaller guns	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Aircraft-carriers and aircraft tenders	8	—	8	4	1†	5	5	1	6	1	1	2	1	—	1	—	—	—	—	—	—
Cruisers	54	2 3†	59	19	8 5†	32	29	4	33	15	3	18	12	13	25	6	1	7	9	1	10
Flotilla Leaders and Destroyers	158	17 9†	184	218	—	218	111	8	119	77	12 6†	95	84	12	96	58	—	58	22	—	22
Submarines	56	7 3†	66	110	3	113	66	4	70	70	28 11†	109	45	31	76	18	3	21	—	—	—

† Authorized for laying down during current year (money voted).

TABLE II.—BATTLESHIPS WITH 14-IN. GUNS AND UPWARDS.

BRITISH EMPIRE.			UNITED STATES.			JAPAN.			FRANCE.			ITALY.			SOVIET UNION.			GERMANY.		
Launched.	Name.	Standard Displacement. (Washington Treaty.)	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.
		tons.			tons.			tons.												
1925	Nelson	33,500	1921	Colorado	32,600	1920	Mutsu ...	32,720												
1925	Rodney	33,900	1921	West Virginia		1919	Nagato ...													
1915	Malaya	31,100	1920	Maryland ...		1917	Hyuga ...	29,990												
1914	Valiant	31,100	1919	Tennessee ...	32,300	1916	Ise													
1914	Barham	30,000	1919	California ...		1915	Yamashiro	29,330												
1913	Queen Elizabeth	31,100	1917	Idaho	32,000	1914	Fuso													
1913	Warspite	31,100	1917	New Mexico ...																
1915	Royal Sovereign	29,150	1917	Mississippi ...																
1914	Royal Oak ...		1915	Arizona	31,400															
1915	Revenge ...		1915	Pennsylvania																
1915	Resolution ...		1914	Oklahoma ...	27,500															
1916	Ramillies ...		1914	Nevada																
			1912	Texas	29,600															
			1912	New York ...																
	12 ships.	367,550		14 ships.	435,400		6 ships.	184,080												

TABLE III.—BATTLE-CRUISERS WITH 14-IN. GUNS AND UPWARDS.

BRITISH EMPIRE.			UNITED STATES.			JAPAN.			FRANCE.			ITALY.			SOVIET UNION.			GERMANY.		
Launched.	Name.	Standard Displacement. (Washington Treaty.)	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.
		tons.						tons.												
1918	Hood...	42,100				1913	Kirishima	26,330												
1916	Renown	32,000				1913	Haruna	29,330												
1916	Repulse					1912	Hiyei *...	26,330												
						1912	Kongo ...	26,330												
	3 ships.	106,100					4 ships.	108,320												

* Retained as training ship in accordance with London Naval Treaty.

TABLE IV.—BATTLESHIPS WITH GUNS BELOW 14-IN.

BRITISH EMPIRE.			UNITED STATES.			JAPAN.			FRANCE.			ITALY.			SOVIET UNION,			GERMANY.		
Launched.	Name.	Standard Displacement. (Washington Treaty.)	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Standard Displacement. (Washington Treaty.)	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.
		tons.			tons.						tons.			tons.			tons.			tons.
1913	Emperor of India†	26,250	1911	Arkansas	29,040				1913	Bretagne	23,128	1913	Andrea Doria	22,630	1914	General Alexieff	22,600	1905	Hannover ..	13,040
1912	Marlborough † ...		1911	Wyoming *	28,500				1913	Lorraine...		1913	Caio Duilio ...		1911	Pariskaia Kommuna	23,000	1906	Schleswig-Holstein	
1912	Iron Duke * ...		1910	Florida †	24,700				1913	Provence		1911	Conte di Cavour	22,030	1911	Marat ...		1906	Schlesien ...	
			1909	Utah †	24,700				1911	Courbet ...	23,128	1911	Giulio Cesare	22,725	1911	Michael Frunze		1902	Braunschweig	13,000
									1911	Jean Bart					1911	October Revolution		1903	Hessen ...	
									1912	Paris ...								1903	Elsass ...	
									1909	Diderot ...	18,592							1904	Lothringen	
									1909	Condorcet									*Building:—*	
									1909	Voltaire ...								—	*Ersatz-Preussen*	10,000
	3 ships.	78,750		4 ships.	106,940					9 ships.	194,544		4 ships.	90,015		5 ships.	114,600		8 ships.	101,120

TABLE V.—BATTLE-CRUISERS WITH GUNS BELOW 14-IN.

BRITISH EMPIRE.			UNITED STATES.			JAPAN.			FRANCE.			ITALY.			SOVIET UNION.			GERMANY.		
Launched.	Name.	Standard Displacement. (Washington Treaty.)	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.
		tons.																		
1913	Tiger †	28,900																		
	1 ship.	28,900																		

* Retained as training ship in accordance with the London Naval Treaty.

† To be disposed of in accordance with the London Naval Treaty.

TABLE VI.—CRUISERS.

BRITISH EMPIRE.		
Speed.	Name.	Standard Displacement. (Washington Treaty.)
kts.		tons.
32¼	London	10,000
32¼	Devonshire ...	
32¼	Shropshire ...	
32¼	Sussex	
32	Berwick... ...	10,000
32	Cornwall ...	
32	Kent	
32	Suffolk	
32	Cumberland ...	
32	Australia (A)	10,000
32	Canberra (A)...	
33	Emerald ...	7,550
33	Enterprise ...	
30	Effingham ...	9,770
30	Frobisher ...	9,860
30	Hawkins ...	9,800
29	Despatch ...	4,850
29	Diomede (N.Z.)	
29	Durban	4,850
29	Delhi	
29	Dunedin (N.Z.)	
29	Danae	
29	Dauntless ...	
29	Dragon	
29	Capetown ...	4,200
29	Cairo	
29	Calcutta	
29	Carlisle	
29	Colombo... ...	
29	Cardiff	4,290
29	Coventry ...	
29	Curlew	4,290
29	Ceres	
29	Curacoa	
29	Caledon	4,180
29	Calypso	
29	Caradoc ...	

UNITED STATES.		
Speed.	Name.	Displacement.
kts.		tons.
35	Omaha ...	7,500
35	Milwaukee	
34·4	Cincinnati ...	
35	Raleigh ...	
35	Detroit ...	
35	Richmond ...	
35	Concord ...	
35	Trenton ...	
35	Marblehead	
35	Memphis ...	
16½	Galveston	3,200
16½	Denver	
21	Rochester ...	8,150
22	Pittsburg ...	13,680
32½	Salt Lake City ...	10,000
32½	Pensacola ...	
32·7	Northampton	
32·7	Chester ...	
32·7	*Louisville* ...	
32·7	*Chicago* ...	
32·7	Houston ...	
32·7	*Augusta* ...	
32·7	*New Orleans*	
32·7	*Portland* ...	
32·7	*Astoria* ...	
32·7	*Indianapolis*	
32·7	*Minneapolis*	
	5 in No. authorised	

JAPAN.		
Speed.	Name.	Displacement.
kts.		tons.
33	Nachi	10,000
33	Myoko ...	
33	Ashigara ...	10 000
33	Haguro ...	
33	Kako	7,500
33	Furutaka ...	
33	Kinugasa ...	
33	Aoba	
33	Naka	5,195
33	Sendai ...	5,195
33	Jintzu ...	5,195
33	Nagara ...	5,170
33	Kinu	5,170
33	Abukuma ...	5,170
33	Natori ...	5,170
33	Isudzu ...	5,170
33	Yura	5,170
33	Kuma... ...	5,100
33	Tama	
33	Kitakami ...	
33	Kiso	
33	O-I	
33	Yubari ...	2,890
33	Tenryu ...	3,230
33	Tatsuta ...	3,230
26	Yahagi ...	4,400
26	Hirado ...	
26	Chikuma ...	
23	Tone	3,760
33	*Takao* ...	10,000
33	*Atago* ...	
33	*Chokai* ...	
33	*Maya* ...	

FRANCE.		
Speed.	Name.	Displacement.
kts.		tons.
34	Tourville	10,000
34	Duquesne	
33	Suffren	10,000
34	Duguay-Trouin	7,234
34	La Motte Picquet	
34	Primauguet ...	
27½	Metz ... ... (*ex* Konigsberg)	6,100
28½	Mulhouse ... ... (*ex* Stralsund)	5,120
27	Strasbourg ... (*ex* Regensburg)	5,511
27	Thionville... ... (*ex* Novara)	3,395
23	Waldeck Rousseau	13,288
23	Ernest Renan ...	13,500
22	Jules Michelet...	12,40 0
33	Colbert	10,000
33	Foch	10,000
26·5	*Jeanne d'Arc* ..	6,500
32	*Dupleix*	10,000
32	*Algerie*	10,000

ITALY.		
Speed.	Name.	Standard Displacement. (Washington Treaty.)
kts.		tons.
36	Trento ...	10,000
36	Trieste ...	
28½	Taranto ... ... (*ex* Strassburg)	4,480
28	Quarto	3,388
27½	Ancona ... ... (*ex* Graudenz)	4,842
27½	Bari ... ... (*ex* Pillau)	4,252
27	Brindisi ... ... (*ex* Helgoland)	3,440
27	Venezia ... ... (*ex* Saida)	3,445
22	Libia...	4,395
22½	San Giorgio ...	10,000
23	San Marco ...	10,915
23	Pisa	10,430
37	*Alberto da Guissano*	4,896
37	*Alberico di Barbiano*	
37	*Bartolomeo Colleoni*	
37	*Giov. della Bande Nere*	
32	*Zara*	10,000
32	*Fiume*	
36	*Gorizia*	10,000
36	*Bolzano*	10,000
37	*Armando Diaz*	5,000
37	*Luigi Cadorna*	5,000
	Pola...	10,000
	Montecuccoli ..	5,100
	Attendolo	5,100

SOVIET UNION.		
Speed.	Name.	Displacement.
kts.		tons.
29½	Profintern ...	6,800
29½	Chevonaya-ukrainia...	7,600
23	General Kornilov	6,675
23	Komintern	6,675
19	Almaz ...	3,300
20	Aurora ...	6,730
29½	*Krasni Kavkas* ...	7,600

GERMANY.		
Speed.	Name.	Displacement.
kts.		tons.
29	Emden ...	6,000
32	Königsberg	6,000
32	Karlsruhe ...	6,000
22	Berlin ...	3,250
22	Hamburg ...	
21	Arkona ...	2,700
21	Amazone ...	2,608
21	Nymphe ...	
32	Köln	6,000
32	*Leipzig* ...	6,000

(A) Australian Navy.

(N.Z.) New Zealand Navy.

TABLE VI.—CRUISERS (*continued*).

BRITISH EMPIRE.			UNITED STATES.			JAPAN.			FRANCE.			ITALY.			SOVIET UNION.			GERMANY.		
Speed.	Name.	Standard Displacement. (Washington Treaty.)	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Standard Displacement. (Washington Treaty.)	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.
kts.		tons.	kts.		tons.	kts.		tons.	kts.		tons.	kts.		tons.	kts.		tons.	kts.		tons.
29	Concord	4,120	32½																	
29	Centaur																			
29	Cambrian ...	3,920																		
29	Canterbury ...																			
29	Constance ...																			
29	Castor																			
29	Champion ...																			
29	Calliope																			
29	Comus	3,895																		
29	Carysfort ...																			
29	Cleopatra ...																			
28¾	Vindictive ..	9,996																		
25½	Adelaide (A)...	5,100																		
25½	Brisbane (A)...	5,120																		
32¼	Norfolk	10,000																		
32¼	Dorsetshire ...	10,000																		
32¼	York	8,400																		
32¼	*Exeter*	8,400																		
	Leander	7,000																		
	Authorised :—																			
	Neptune ...																			
	Orion																			
	Achilles ...																			
	56 ships. (and 3 authorised.)	355,781		27 ships. (and 5 authorised.)	233,230		33 ships.	208,415		18 ships.	158,056		25 ships.	169,371		7 ships.	45,380		10 ships.	44,416

(A) Australian Navy.

(N.Z.) New Zealand Government.

NOTE.—Vessels of which the names are printed in italics are under construction.

TABLE VII.—AIRCRAFT CARRIERS AND AIRCRAFT TENDERS.

BRITISH EMPIRE.			UNITED STATES.			JAPAN.			FRANCE.			ITALY.			SOVIET UNION.			GERMANY.		
Launched.	Name.	Standard Displacement. (Washington Treaty.)	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Standard Displacement. (Washington Treaty.)	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.
		tons.			tons.			tons.			tons.			tons.						
1916	Furious ...	22,450	Converted 1921	Langley ... (formerly collier Jupiter)	12,700	1920	Notoro ‡	14,050	1920	Béarn † ...	21,160	1923	Miraglia	4,881						
1917	Argus ...	14,000	Do.	Wright... ...	11,000	1921	Hosho ...	7,470	1929	*Commandant Teste*	10,000									
1917	Ark Royal	6,900	1925	Lexington *...	33,000	—	Wakamiya	5,180												
1914	Hermes ...	10,850	1925	Saratoga * ...		1925	Akagi *	26,900												
1919	Eagle † *	22,600		1 authorised	13,800	1921	Kaga †	26,900												
1918	Courageous	22,500					*Ryujo*	7,600												
1928	Albatross (A)	5,000																		
1916	Glorious *	22,500																		
	8 ships.	126,800		5 ships.	103,500		6 ships.	88,100		2 ships.	31,160		1 ship.	4,881		Nil	—		Nil	—

* Designed as battle-cruisers; converted to aircraft-carriers under the Washington Treaty.
† Designed as battleships
‡ Converted from an oiler.
(A) Australian Navy.

NOTE.—Vessels of which the names are printed in italics are under construction.

BRITISH AND FOREIGN ORDNANCE TABLES

VICKERS-ARMSTRONGS LIMITED—GUNS AND MOUNTINGS.

NAVAL GUNS AND MOUNTINGS.

		37 mm. 1-pdr. Auto.	37 mm. 1½-pdr. Auto.	40 mm. 2-pdr. Auto.	47 mm. 3-pdr. Auto.	47 mm. 3-pdr. Semi-Auto.	57 mm. 6-pdr. Semi-Auto.	3-in. 76·2 mm. Semi-Auto.	4-in. 101·6 mm. Semi-Auto.	**4-in. 101·6 mm. Semi-Auto.**	4-in. 101·6 mm.	4·7-in. 120 mm.	4·7-in. 120 mm.	5-in. 127·2 mm.	5-in. 127·2 mm.	5·5-in. 139·7 mm.
Diameter of Bore . .	ins.	1·457	1·457	1·575	1·85	1·85	2·244	3	4	4	4	4·724	4·724	5	5	5·5
do. do. . .	mm.	37	37	40	47	47	57	76·2	101·6	101·6	101·6	120	120	127·2	127·2	139·7
Length of Bore . .	cals.	30	42·5	40	50	55	50	50	45	45	50	45	50	45	50	50
		lbs.	lbs.	lbs.	cwts.	cwts.	c. q.	cwts.	cwts.	c. q.	c. q.	t. c.	t. c.	t. c.	t. c.	t. c.
Weight of Gun . .		432	490	616	6	7·5	9 1	19	40	36 0	40 0	3 2	3 4	4 1	3 17	5 13
do. do. . .	kg.	196	222	279	305	380	470	978	2,032	1,830	2,032	3,150	3,250	4,114	3,912	5,740
Weight of Projectile .	lb.	1	1·5	2	3·3	3·3	6	12·5	31	31	31	48·5	50	60	60	83
do. do. .	kg.	0·454	0·68	0·907	1·5	1·5	2·72	5·67	14·06	14·06	14·06	22·0	22·68	27·2	27·2	37·6
Muzzle Velocity . .	f.s.	1,800	2,100	2,000	2,800	3,000	2,600	3,000	2,625	2,700	3,000	2,789	2,900	2,700	3,000	2,900
do. do. . .	m.s.	549	640	610	853	914	792	914	800	823	914	850	884	823	914	884
Muzzle Energy . .	f.t.	22·5	46	55·5	180	206	280	780	1,480	1,565	1,935	2,616	2,916	3,032	3,744	4840
do. do. . .	m.t.	7	14·25	17·2	55·75	64	86·7	242	459	485	600	810	903	939	1,160	1,500
Penetration . . .	ins.	..	..	..	6·7	7·3	7·5	11·5	13·0	13·6	16	16·6	17·8	17·2	20	21·5
do.	mm.	..	..	..	170	185	190	290	330	345	405	420	450	436	510	545
Rounds per Minute . . .		250	200	200	30	30	28	20	20	18	15	12	12	10	10	10
				lb.	c. q. lb.	c. q. lb.	c. q. lb.	t. c. q. lb.	t. c. q. lb.	t. c. q.	t. c. q.	t. c. q.	t. c. q.	t. c. q. lb.	t. c. q. lb.	t. c. q. lb.
Weight of Mounting and Shield		..	..	1,040	11 2 5	13 0 0	17 3 10	1 3 1 10	2 18 3 0	2 18 3	3 5 1	3 5 2	4 1 0	5 1 2 0	5 3 0 0	12 9 2 0
do. do. do.	kg.	..	..	472	586	660	906	1,186	2,985	2,985	3,315	3,330	4,115	5,156	5,233	12,675
		..	..	..	c. q. lb.	c. q. lb.	c. q. lb.	c. q. lb.	c. q. lb.	c. q. lb.	c. q. lb.	c. q. lb.		c q. lb.	c. q. lb.	t. c. q. lb.
Weight of Shield		..	..	..	1 0 20	1 0 20	1 2 10	2 0 14	7 2 0	7 2 0	14 1 13	9 0 0	..	18 0 0	18 0 0	1 2 0 0
do. do. . .	kg.	..	..	..	60	60	70	108	380	380	730	460	..	914	914	1,118
Thickness of Shield .	ins.	..	..	..	·22	·22	·25	·25	·144	·144	·25	·144	..	·144	·144	·1875
do. do. . .	mm.	..	..	..	5·6	5·6	6·35	6·35	3·65	3·65	6·35	3·65	..	3·65	3·65	4·76
Angle of Elevation .	**deg.**	..	..	80	20	20	20	20	30	30	30	35	35	35	35	30
Angle of Depression .	**deg.**	..	..	5	10	10	10	10	10	10	10	10	10	10	10	5

The above guns are of all-steel construction. Guns of steel and wire construction are manufactured having approximately the same characteristics.

Naval Guns and Mountings—*continued.*

		6-in. 152 mm.	6-in. 152 mm. Semi-Auto.	6-in. 152 mm.	8-in. 203 mm.	8-in. 203 mm.	8-in. 203 mm.	9·2-in. 234 mm.	9·2-in. 234 mm.	10-in. 254 mm.	10-in. 254 mm.	12-in. 305 mm.	12-in. 305 mm.	13·5-in. 343 mm.	14 in. 356 mm.	15-in. 381 mm.	16-in. 406 mm.
Diameter of Bore	ins.	6	6	6	8	8	8	9·2	9·2	10	**10**	**12**	**12**	**13·5**	**14**	**15**	**16**
do. do.	mm.	152·4	152·4	152·4	203·2	203·2	203·2	233·7	233·7	254	254	304·8	304·8	342·9	355·6	381	406·2
Length of Bore	cals.	45	50	50	45	50	55	45	50	45	50	45	50	45	50	45	45
		t. c.	t. c.	t. c.	t. c.	t. c.	t. c.	t. c.	t. c. q.	t. c.	t. c.	t. c.	t. c.	t. c.	t. c.	t. c.	t. c.
Weight of Gun		6 10	6 18	8 5	18 0	15 0	16 10	26 15	28 16 2	23 10	26 1	40 0	43 10	66 0	80 0	87 0	105 0
do. do.	kg.	6,605	7,010	8,380	18,290	15,240	16,765	271,80	29,290	23,875	26,470	40,640	44,200	67,060	81,284	88,396	106,685
Weight of Projectile	lb.	100	100	100	250	256	256	380	380	500	500	850	850	1,400	1,560	1,920	2,000
do. do.	kg.	45·36	45·36	45·36	113·4	116·0	116·0	172·37	172·37	226·8	226·8	385·6	385·6	635	707·6	871	907·2
Muzzle Velocity	f.s.	2,850	3,000	2,900	2,845	3,000	3,150	2,750	3,000	2,800	2,933	2,800	2,933	2,500	2,475	2,400	2,650
do. do.	m.s.	869	914	884	867	914	960	838	914	853	894	853	894	762	754	732	808
Muzzle Energy	f.t.	5,630	6,240	5,830	14,030	15,976	17 615	19,926	23,714	27,180	29,825	46,210	50,705	60,675	66,260	76,685	97,390
do. do.	m.t.	1,745	1,932	1,805	4,345	4,950	5,445	6,170	7,340	8,420	9,235	14,310	15,705	18,790	20,520	23,750	30,160
Penetration	ins.	22	23·7	22·6	31	34·5	38	34·4	38·8	39·2	41·7	47·3	50·3	51·5	51·65	53·2	59
do.	mm.	560	600	575	785	875	965	875	985	995	1,060	1,200	1,280	1,310	1,310	1,350	1,500
Rounds per Minute		10	10	10	5	6	6	4	4	3	3	2	2	1·5	1·5	1·2	1·2
		t. c. q.	t. c. q.	t. c. q.													
Weight of Mounting and Shield		12 9 2	12 1 0	14 0 2	..	..	..	..	..	..	..	..	..	..	..	..	..
do. do. do.	kg.	12,675	12,245	14,250	..	..	..	..	..	..	..	..	..	..	..	..	..
		t. c. q. lb.	t. c. q. lb.	t. c. q. lb.													
Weight of Shield		4 4 3 16	3 4 0 0	5 5 1 15	..	..	..	..	..	..	..	..	..	..	..	..	..
do. do.	kg.	4,315	3,250	5,355	..	..	..	..	..	..	..	..	..	..	..	..	..
Thickness of Shield	ins.	1·5 & 1	·625 & ·375	3 to 1·2	..	..	..	..	..	..	..	..	..	..	..	..	..
do. do.	m.m	38 & 25·4	16 & 9·5	76 to 30	..	..	..	..	..	..	..	..	..	..	..	..	..
Angle of Elevation	deg.	30	35	30	..	..	..	..	..	..	..	..	..	..	..	..	..
Angle of Depression	deg.	5	10	7	..	..	..	..	..	..	..	..	..	..	..	..	..

The above guns are of all-steel construction. Guns of steel and wire construction are manufactured having approximately the same characteristics.

VICKERS-ARMSTRONGS LIMITED.—GUNS AND MOUNTINGS. HOWITZERS AND FIELD GUNS.

		2·953-in. 75 mm. Field.	3·3-in. 83·8 mm. Field.	3·543-in. 90 mm. Field.	4·134-in. 105 mm. Howr.	4·134-in. 105 mm. Field.	4·134-in. 105 mm. Field.	5-in. 127 mm. Field.	5·9-in. 150 mm. Howr.	6-in. 152 mm. Railway Truck.	8-in. 203 mm. Howr.	9·2-in. 234 mm. Howr.	9·2-in. 234 mm. Siege Howr.	9·2-in. 234 mm. Railway Truck.	12-in. 305 mm. Siege Howr.	14-in. 356 mm. Railway Truck.
Diameter of Bore	ins.	2·953	3·3	3·543	4·134	4·134	4·134	5	5·9	6	8	9·2	9·2	9·2	12	14
do. do.	mm.	75	83·8	90	105	105	105	127	150	152	203	234	234	234	305	356
Length of Bore	cals.	28	35	29	20	28	45	41	21·5	50	14	13·2	17·2	35	17·3	45
Weight of Gun		c. q. 7 0	cwt. 14¾	c. q. 9 3	c. q. 9 1	c. q. 17 2	t. c. q. 1 13 0	t. c. q. 2 11 2	t. c. q. 1 19 2	t. c. 8 14	t. c. q. 2 18 0	t. c. 3 8	t. c. q. 4 5 2	t. c. 24 4	t. c. q. 9 2 2	t. c. 83 5
do. do.	kg.	355	750	495	470	890	1,675	2,615	2,005	8,840	2,945	3,454	4,345	22,774	9,270	84,585
Weight of Projectile	lb.	14·33	20½	22·05	30·9	30·9	35·27	56	90·4	100	220·5	290	290	380	750	1,586
do. do.	kg.	6·5	9·25	10·0	14·0	14·0	16·0	25·4	41·0	45·36	100·0	131·54	131·54	172·36	340·0	719·4
Muzzle Velocity	f.s.	1,920	1,900	2,100	1,560	2,000	2,740	2,700	1,790	3,000	14,76	1,190	1,520	2,300	1,520	2,500
do. do.	m.s.	585	579	640	475	610	835	823	545	914	450	362	463	700	463	762
Muzzle Energy	f.t.	366	513	675	521	856	1,840	2,830	2,010	6,240	3,330	2,850	4,645	13,940	12,015	68,735
do. do.	m.t.	113	159	209	161	265	570	877	622	1,930	1030	882	1,440	4,320	3,720	21,285
Rounds per Minute		25	20	12	10	10	8	6	4	7	2	4	2	4	1	2
Weight of Mounting and Shield		c. q. lb. 18 0 0	cwt. 20·5	c. q. lb. 23 1 0	c. q. 22 0	c. q. lb. 38 2 0	t. c. q. 2 15 2	t. c. q. 4 10 0	t. c. q. 2 16 2	tons 10	t. c. q. 5 3 0	t. c. 5 7	t. c. q. 11 15 0	t. c. 65 10	t. c. q. 28 7 2	t. c. 163 15
do. do. do.	kg.	915	1,040	1,180	1,120	1,955	2,820	4,570	2,870	10,160	5,230	5,435	11,940	66,550	28,830	166,380
Weight of Shield		c. q. lb. 1 3 14	..	c. q. lb. 2 0 16	c. q. lb. 1 2 0	c. q. lb. 3 0 0	c. q. 3 2	..	..	..	..	..	..	..	..	..
do. do.	kg.	95	..	109	76	152	178	..	..	..	..	..	..	..	..	..
Thickness of Shield	ins.	·125	..	·128	·144	·144	·157	..	..	..	..	..	..	..	..	..
do. do.	mm.	3·17	..	3·25	3·65	3·65	4	..	..	..	..	..	..	..	..	..
Angle of Elevation	deg.	40	40	40	45	40	43	50	42	40	60	45	50	40	65	40
Angle of Depression	deg.	5	5	5	5	5	0	5	0	0	0	0	0	0	0	0

		TANK GUNS.			MOUNTAIN HOWITZERS.		LANDING GUN.
		57-mm. 6-pdr. Semi-Auto.	47-mm. 3-pdr. Semi-Auto.	40-mm. 2-pdr. Semi-Auto.	2·953-in. (75 mm.) Jointed.	4·134-in. (105 mm.) Jointed.	3-in. (76·2 mm.)
Diameter of Bore	ins.	2·244	1·85	1·575	2·953	4·134	3
do. do.	m.m.	57	47	40	75	105	76·2
Length of Bore	cals.	27	35	37	17	11	22
Weight of Gun		c. q. lb. 2 2 14	c. q. lb. 2 2 0	c. q. lb. 1 2 0	c. q. lb. 3 1 24	c. q. lb. 5 0 0	c. q. lb. 3 3 4
do. do.	kg.	133	127	63·5	177	254	192
Weight of Projectile	lb.	6	3·3	2	14·33	26·45	12·5
do. do.	kg.	1·5	2·72	0·907	6·5	12	5·67
Muzzle Velocity	f.s.	1,200	1,854	2,000	1,450	1,148	1,640
do. do.	m.s.	366	565	610	442	350	500
Muzzle Energy	f.t.	60	79	55·5	210	242	233
do. do.	m.t.	18·6	24·5	17·2	65·0	74·5	72·0
Rounds per Minute		..	..	..	18	10	25
Weight of Mounting and Shield		c. q. lb. 2 2 0	c. q. lb. 2 2 0	c. q. lb. 2 1 7	c. q. lb. 11 2 5	c. q. lb. 12 0 0	c. q. lb. 9 2 0
do. do. do.	kg.	127	127	117·5	586	610	483
Weight of Shield		..	..	..	c. q. lb. 1 2 10	c. q lb. 1 2 10	c. q. lb. 1 1 15
do. do.	kg.	..	..	..	76	76	70
Thickness of Shield	ins.	..	..	..	·16	·16	·192
do. do.	mm.	..	..	..	4·0	4·0	4·875
Angle of Elevation	deg.	30	30	25	45	45	23
Angle of Depression	deg.	10	10	10	5	5	10

VICKERS-ARMSTRONGS LIMITED—GUNS AND MOUNTINGS.—GUNS MOUNTED ON AIRCRAFT.

		*·303-in. (7·7 mm.) Auto. Observer's gun.	*·303-in. (7·7 mm.) Auto. Pilot's gun.	·5-in. (12·7 mm. Auto. Pilot's gun.	1-in. (25 mm.) Auto.	1·457-in. (37 mm.) Auto.	1·575-in. (40 mm.) Semi-Auto.
Diameter of Bore	ins.	·303	·303	·5	1	1·457	1·575
do. do.	mm.	7·7	7·7	12·7	25·4	37	40
Length of Bore	cals.	79·2	93·7	60	30	22	40
Weight of Gun	lb.	22	30	52	110	150	234
do. do.	kg.	10	13·6	23·6	50	68	106
Weight of projectile	lb.	**174 grs.**	**174 grs.**	**550 grs.**	**·441**	**1**	**2**
do. do.	kg.	**11·3 grms.**	**11·3 grms.**	**35·65 grms.**	**0·2**	**0·454**	**0·91**
Muzzle Velocity	f.s.	**2,300**	**2,400**	**2,635**	**1,542**	**1,200**	**2,300**
do. do.	m.s.	**700**	**732**	**803**	**470**	**366**	**700**
Muzzle Energy	f.t.	**0·9**	**1**	**3·75**	**7·25**	**10**	**73**
do. do.	m.t.	**0·28**	**0·31**	**1·16**	**2·25**	**3**	**22·6**
Rounds per Minute		**500–600**	**500–1,000**	**400–600**	**150**	**150**	..
Weight of Mounting	lb.	..	..	..	**60**	**142**	**432**
do. do.	kg.	..	..	..	**27**	**64**	**196**
Angle of Elevation	deg.	..	..	..	**40**	**60**	**60**
Angle of Depression	deg.	..	..	..	**90**	**60**	**30**

* This machine can be adapted to fire any pattern of rifle calibre ammunition.

MACHINE GUNS—ANTI-AIRCRAFT.

		Vickers ·303-in. (7·7 mm.) Auto.	Vickers-Armstrongs Colt. ·303-in. (7·7 mm.) Auto.	Vickers (12·7 mm.) ·5-in. Auto.	Vickers ·5-in. H.V. (12·7 mm.)	Vickers-Armstrongs Colt. ·5-in. (12·7 mm.) Auto.	Vickers-Armstrongs Colt, ·8-in. (20·3 mm.).	Vickers 1-in. (25·4 mm.) Auto.	Vickers 40-mm. 2-pdr. Auto.
Diameter of Bore	ins.	·303	·303	·5	·5	·5	·8	1·0	1·575
do. do.	mm.	7·7	7·7	12·7	12·7	12·7	20·3	25·4	40
Length of Bore	cals.	93·7	79	60	90	72	65	40	39·37
Weight of Gun	lb.	32	30	52	81	82	147	187	616
do. do.	kg.	14·5	13·6	23·6	36·7	37·2	66·6	85	280
Weight of Projectile	lb.	·249	·249	·175	·25	·115	·328	·551	2
do. do.	kg.	·113	·113	·079	·113	·052	·148	·25	·9
Muzzle Velocity	f.s.	2,440	2,400	2,635	3,000	2,580	2825	2,000	1,972
do. do.	m.s.	744	732	803	914	786	861	610	600
Muzzle Energy	f.t.	1	0·9	3·78	5·92	4·77	18·1	15·5	54
do. do.	m.t.	·31	0·28	1·17	1·83	..	5·62	4·81	17
Rounds per minute		500–600	650	400–600	300	650	120	200	200
Weight of Mounting	lbs.	38	56	182	111	86	400	379	1,243
do. do.	kgs.	17·25	25·4	82·6	50·4	39	181	174	563·8
Angle of Elevation	deg.	80	75	90	90	75	90	80	80
Angle of Depression	deg.	20	35	5	5	35	70	10	5

Vickers-Armstrongs Limited—Guns and Ammunition. Infantry Guns.

		44–60 mm.			47 mm.			65 mm.		
		44 mm. Barrel.		60 mm. Barrel.	Armour-Piercing Ammunition.		High-Explosive Ammunition.		High Explosive Ammunition.	
Diameter of Bore	ins.	1·73		2·36		1·85			2·559	
do. do.	mm.	44		60		47			65	
Length of Bore	cals.	30		20		20			16	
		Barrel.	Breech Ring.	Breech Mechanism.	Barrel.	Breech Ring.	Breech Mechanism.	Barrel.	Breech Ring.	Breech Mechanism.
Weight of Gun		75 lb.	50 lb.	26 lb.	78 lb.	55 lb.	31 lb.	88 lb.	62 lb.	38 lb.
do. do.	kg.	34	22·7	11·8	35·4	25	14	38	28	17
Weight of Projectile . .	lb.	2·75		5·5	3·3		3·3		8·818	
do. do.	kg.	1·25		2·5	1·5		1·5		4	
Muzzle Velocity	f.s.	1,706		732	1,600		755		820	
do. do.	m.s.	520		223	488		230		250	
Muzzle Energy	f.t.	55·5		20·4	58·6		13·0		41·0	
do. do.	m.t.	17·2		6·3	18		4		12·7	
Weight of Mounting and Shield	lb.		326			346			408	
do. do. do.	kg.		148			157			185	
Weight of Shield	lb.		—			45			50	
do. do.	kg.		..			20·4			22·6	
Thickness of Shield	ins.		..			0·14			0·14	
do. do.	mm.		..			3·5			3·5	
		44 mm. Barrel.		60 mm. Barrel.	Low Position.		High Position.	Low Position.		High Position.
Angle of Elevation	deg.	10		20 to 60	15		45	20		45
Angle of Depression	deg.	5		0	10		2½	10		2½

VICKERS-ARMSTRONGS LIMITED—GUNS AND MOUNTINGS. MACHINE GUNS.

		*Vickers ·303-in. (7·7-mm.) Auto. Observer's Gun for Air-craft.	*Vickers ·303-in. (7·7-mm.) Auto. Pilot's Gun for Air-craft.	*Vickers ·303-in. (7·7-mm.) Auto. Land Service and Naval.	*Vickers-Arm-strongs Colt ·303-in. (7·7-mm.) Auto. Ob-server's Gun for Air-craft.	*Vickers-Arm-strongs Colt ·303-in. (7·7-mm.) Auto. Pilot's Gun for Air-craft.	*Vickers-Arm strongs Colt ·303-in. (7·7-mm.) Auto. Land and Naval.	Vickers ·5-in. (12·7-mm.) Auto. Land and Naval.	**Vickers ·5-in. (12·7-mm.) Auto. Pilot's Gun for Air-craft.**	**Vickers-Arm-strongs Colt ·5-in. (12·7-mm.) Auto. Land and Naval.**	**Vickers-Arm-strongs Colt ·5-in. (12·7-mm.) Auto. Pilot's Gun for Air-craft.**	**Vickers-Arm-strongs Colt ·8-in. (20·3-mm.) Auto. for Naval.**	**Vickers 1-inch (25-mm.) Auto. for Air-craft.**	**Vickers 1·457-in. (37 mm.) Auto. for Air-craft.**	**Vickers 1·1575-in (40-mm.) Auto-Naval.**
Diameter of Bore .	ins.	·303	·303	·303	·303	·303	·303	·5	·5	·5	·5	·8	1	1·457	1·575
do. do. .	mm.	7·7	7·7	7·7	7·7	7·7	7·7	12·7	12·7	12·7	12·7	20·3	25·4	37	40
Length of Bore . .	cals.	79·2	93·7	93·7	79	79	79	90	60	72	72	65	30	22	39·37
Weight of Gun . .	lb.	22	30	32	24·75	24·75	36·75	80	52	82	52	147	110	150	616
do. do. . .	kg.	10	13·6	14·5	11·2	11·2	16·67	36·5	23·6	37·2	23·6	66·6	50	68	280
Weight of Projectile .	grs.	174	174	174	174	174	174	770 664	550	805	805	2,299	3,086	7,005	14,010
do. do. .	grms.	11·3	11·3	11·3	11·3	11·3	11·3	50 43	35·7	52	52	149·0	200·0	454·0	908·0
Muzzle Velocity . .	f.p.s.	2,400	2,440	2,440	2,400	2,400	2,400	2,725 3,000	2,630	2,580	2,580	2,825	1,542	1,200	1,972
do. do. .	m.p.s.	732	744	744	732	732	732	830 914	803	786	786	861	470	366	600
Muzzle energy . .	f.t.	0·9	1	1	0·9	0·9	0·9	5·65 5·92	3·75	4·77	4·77	18·15	7·25	10	54,
do. do. . .	m.t.	0·28	0·31	0·31	0·28	0·28	0·28	1·75 1·83	1·16	..	..	5·62	2·25	3	17
Rounds per minute . . .		500–600	500–1000	500–600	1,200	1,200	650	300–400	400–600	400–650	400–650	120	150	50	200
Weight of Mounting .	. lb.	..	..	38	..	..	56	109	..	86	—	400	60	42	1,243
do. do. .	. kg.	..	..	17·25	..	..	25·4	50	..	39	..	181	27	64	563·8
Angle of Elevation . . .		..	..	80°	..	..	75°	90°	..	75°	..	90°	40°	60°	80°
Angle of Depression . . .		..	..	20°	..	..	35°	5°	..	35°	..	7°	90°	60°	5°

* These machine guns can be adapted to fire any pattern of rifle calibre cartridge.

Anti-Aircraft Guns.

		·303-in. Auto.	·5-inch Auto.	1-inch Auto.	40-mm. 2-pr. Auto.	40-mm. 2·2-pdr. Auto.	40-mm. 2·2-pdr. Semi-Auto.	47-mm. 3-pdr. Semi-Auto.	3-inch Q.F.	3-inch Semi-Auto.	3·15-in. Semi-Auto.	4-in. Semi-Auto.	4-in. Semi-Auto	4·7-in Semi-Auto.
Construction		Steel	Steel	Steel	Steel	Steel	Steel	Steel	Steel	Steel	Steel	Steel	Steel	Steel
Diameter of bore	ins.	·303	·5	1	1·575	1·575	1·575	1·85	3	3	3·15	4	4	4·724
” ”	mm.	7·7	12·7	25·4	40	40	40	47	76·2	76·2	80	101·6	101·6	120
Length of bore	cals.	93·7	90	40	40	50	50	50	45	50	47	45	50	40
Weight of gun	lb.	32 lb.	80 lb.	187 lb.	616 lb.	900 lb.	c. q. lb. 2 0 17	c. q. lb. 6 0 0	c. q. lb. 18 1 0	t. c. q. 1 2 0	c. q. lb. 18 3 0	t. c. q. 1 18 3	t. c. q. 2 0 0	t. c. q. 3 1 0
” ”	kgs.	14·5	36·3	84·7	279	408·2	109·3	304·8	927·1	1117·6	952·2	1968·6	2032·1	3098·9
Weight of projectile	lb.	174 grs.	770 grs.	·551	2	2·205	2·205	3·3	12·5	14·33	17·64	31	31	48·5
” ”	kgs.	11·3 grms.	50 grms.	·23	·907	·99	·99	1·5	5·6	6·5	8·0	14·06	14·06	21·9
Muzzle velocity	f.s.	2,400	2,725	2,000	2,000	2,625	2,625	2,800	2,600	2,560	2,624	2,700	2,850	2,560
” ”	m.s.	732	830	609	609	800	800	853	792	780	800	823	869	780
Muzzle energy	f.t.	1	5·65	15·5	55·5	105	105	180	586	650	842	1,565	1,740	2,205
” ”	m.t.	·31	1·72	4·72	16·9	32	32	54·8	107·8	198	256·6	477	530	672
Rounds per minute		500–600	300–400	250	200	100	35	30	20	25	25	18	18	12
Weight of mounting		38 lb.	109 lb.	379 lb.	c. q. lb. 10 3 12	c. q. lb. 14 1 15	c. q. 12 3	c. q. lb. 18 2 3	t. c. q. lb. 1 19 3 9	t. c. q. 2 7 3	t. c. q. lb. 2 12 0 0	t. c. q. lb. 6 4 0 18	t. c. q. lb. 6 12 0 0	t. c. q. lb. 9 0 1 0
” ”	kgs.	17·2	49·3	171·8	551·5	730	647·6	941·1	2023·4	2425·8	2641·7	6307·7	6706·0	9157·1
Angle of elevation	deg.	**80**	**90**	**80**	**80**	**85**	**90**	**80**	**90**	**90**	**90**	**90**	**90**	**90**
Angle of depression	deg.	20	10	10	5	5	0	5	5	5	5	5	5	5

BEARDMORE GUNS AND HOWITZERS.

		NAVAL.																	
Calibre	ins.	4	4	4·7	4·7	4·7	5·5	5·5	5·5	6·0	6·0	7·5	8	8	9·2	12	13·5	15	16
do.	mm.	101·6	101·6	120	120	120	140	140	140	152	152	190	203·2	203·2	234	305	343	381	406
Length of Bore	cals.	50	55	50	45	52·5	55	55	40	50	52·5	45	50	55	50	50	46	45	45
Weight of Gun	tons	2·15	2·45	3·65	3·35	3·85	8·0	6·8	5·35	7·95	8·1	13·9	17·5	19·25	29	66	77	96	107
do. do.	kg.	2,184	2,489	3,711	3,405	3,911	8,128	6,910	5,435	8,077	8,230	14,122	17,780	18,542	24,402	67,056	78,232	97,536	108,712
Weight of Projectile	lbs.	31	31	50	50	48·5	92·6	82	75	100	100	200	250	250	425	950	1,350	1,850	2,100
do. do.	kg.	14·06	14·06	22·68	22·68	22	42	37·2	34	45·36	45·36	90·72	114·2	114·2	192·8	430·9	612·4	839·2	952·5
Muzzle Velocity	f.s.	2,920	3,000	2,950	2,650	3,000	2,950	3,000	2,650	2,970	3,000	2,750	2,900	3,000	2,825	2,825	2,650	2,620	2,675
do. do.	m.s.	890	914	900	808	914·4	900	914·4	808	905·2	914·4	838	884	914	861	861	808	799	815
Muzzle Energy	f.t.	1,833	1,935	3,017	2,434	3,026	5,587	5,117	3,652	6,116	6,240	10,488	14,579	15,602	23,518	52,571	63,738	88,056	104,198
do. do.	m.t.	568	599	934	837	937	1,730	1,584	1,131	1,894	1,938	3,248	4,515	4,832	7,283	16,280	20,441	27,270	32,270

		Motor Boats or Sub-marines.	Sub-marine.	ANTI-AIRCRAFT.					TANK GUNS.	
				For Sub-marines.	Fixed.	Fixed.	Mobile.			
Calibre	ins.	3·0	4·0	3·0	3·0	4·0	3·02	3·3	1·85	2·24
do.	mm.	75	101·6	75	75	101·6	77	84	47	57
Length of Bore	cals.	45	40	45	45	45	47·5	42·5	30·0	23
Weight of Gun	ton	0·67	1·3	0·64	1·65	2·15	0·75	1·1	1·8 cwt.	5·6 cwt.
do. do.	kg.	686	1,321	648	1,675	2,185	762	1,120	90·7	284
Weight of Projectile	lbs.	12·5	31	16	16	31	17·6	21	3·25	6
do. do.	kg.	5·67	14·06	7·26	7·26	14·06	8·0	9·53	1·49	2·72
Muzzle Velocity	f.s.	2,200	2,250	2,100	2,590	2,600	2,175	2,300	1,750	1,525
do. do.	m.s.	670	685·8	640	790	792	663	701	533	465
Muzzle Energy	f.t.	419	1,088	489	744	1,453	577	770	69	96·7
do. do.	m.t.	130	337	151	230	450	179	238	21·6	30

Semi-Auto.

		ANTI-TANK.			FIELD GUNS AND HOWITZERS.									
		Infantry Guns.			Gun.	How.	How.	How.	How.	Gun.	How.	How.	Mountain H.	
Calibre I	ins.	1·85	1·575	2·24	3·3	4·134	3·3	4·5	6	6	8	9·2	3·3	
do.	mm.	47	40	57	84	105	84	112	152·4	152·4	203·2	234	84	
Length of Bore	cals.	28·5	37	24	31	20	15	20	13	35	17	17	12·25	
		cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	tons	tons	tons	tons	wts.	
Weight of Gun		1·03	0·92	0·92	7·25	8·0	4·28	9	1·15	3·7	3·0	4·25	4·0	
do. do.	kg.	52·4	46·7	46·7	369	406	194	458	1,168	3,759	3,048	4,318	203	
Weight of Projectile	lbs.	3·25	2·0	6·0	18·5	35·2	18·5	35		100	200	290	18·5	21·0
do. do.	kg.	1·49	0·91	2·72	8·39	16	8·39	15·88	45·36	45·36	90·72	131·5	8·39	9·53
Muzzle Velocity	f.s.	1,550	2,000	700	1,820	1,350	1,100	1,100	1,250	2,375	1,500	1,500	1,040	960
do. do.	m.s.	473	609·6	213·4	555	412	335	335·3	381	724	457	457	317	290
Muzzle Energy	f.t.	54	55	20·4	425	444	155	293·6	1,083	3,911	3,120	4,524	138	134
do. do.	m.t.	16·7	17	6·3	131	138	48	90·9	335	1,211	956	1,401	42·7	41·5
		S.A.	S.A.	S.A.										

In same carriage.

In same carriage.

FRENCH NAVAL ORDNANCE.

Date and Pattern of Gun.	Model 1893–96.	Model 1893–96.	Model 1893-96.	Model 1902.	Model 1902-06.	Model 1906.	Model 1906-10.	Model 1910.	Model 1912.	Model 1919.	Model 1920.	Model 1923.	Model 1924.	Model 1924.	Model 1927.
Calibre . . . cms.	19·4	16·4	16·4	19·4	24	30·5	30·5	13·8	34	13	15·5	13 8	13	20·3	13·8
Calibre . . . ins.	7·64	6·46	6·46	7·64	9·45	12·01	12·01	5·43	13·4	5·12	6·1	5·43	5·12	7·99	5·43
Length . . . cals.	40	45	45	50	49·5	45	44·67	55	45	40	50	40	40	50	40
Total weight . tons	12·48	8·1	8·09	14·94	28·8	53·23	53·16	5·22	65·23	4·32	8·73	4·05	3·81	20 39	4 81
Firing Charge, A.P. Projectile . . lbs.	74·3	43·45	45·8	84·66	147·05	287·7	277·8	23·68	334	17·05	43·21	17·86	17·05	103·12	17·86
A.P. Projectile . lbs.	199·09	121·03	121·03	199·08	487·22	970·32	952·38	80·47	1222·44	70·44	124·07	87·98	70·44	271·61	87·98
Muzzle Velocity . f.-s.	2,756	2,838	2,911	3 117	2,625	2,559	2,569	2,723	2,605	2,408	2,789	2,297	2,408	2,789	2,297

ITALIAN NAVAL ORDNANCE.

Official Designation :— Calibre mm., length cal.	305/46	254/45	254/45	203/50	190/45	152/53	152/50	152/45	120/30	120/50	120/45	102/45	100/47	102/35	76/50	76/45	76/17
Mark A. = Armstrong, V = Vickers, An. = Ansaldo. S. = Schneider.	A., V.	A.	V.	S.-An.	A., V.	An.	A.	S.	An.	A., V.	A.	S. A.	R.M.	S.	A., V.	S.	S.
Date of introduction.	1909	1907	1906	1924	1906	1927	1918	1911	1926	1909	1913–1918.	1917	1928	1914–1915	1909	1911	1912
Designation by calibre, cm.	30·479	25·4	25·4	20·3	19·05	15·24	15·24	15·24	12·0	12·0	12·0	10·2	10·0	10·2	7·62	7·62	7·62
Calibre in inches . . .	12	10	10	8	7·5	6	6	6	4·75	4·75	4·75	4	3·9	4	3	3	3
Lengths: Total, in feet	47·77	39·07	38·715	34·593	29·22	25·39	25·94	23·42	19·57	20·38	18·38	15·715	15·721	12·247	13·271	11·722	4·593
Lengths: Rifled Bore, in inches .	477·9	358·4	370·5	—	281·7	—	256·6	219·2	—	204·64	174·64	150·74	12·365	114·29	126	107·2	44·8
Lengths: Powder Chamber in inches	97·7	74·91	74·91	—	51·65	—	44·6	44·6	—	28·64	35·03	27·16	3·112	23·50	22	25·4	—
Lengths: Bore in calibres . . .	37·3	35·84	37·05	—	37·5	—	42·77	36·54	—	43·31	36·96	37·53	15·371	28·46	42	35·73	14·96
No. of Grooves	72	60	70	52	44	44	36	56	36	36	36	40	26	32	28	25–8	24
Twist of Rifling, in calibres	30	30	00–30	30	00–30	30	33	36	30	30	30	—	30	—	30	35·9	22
Total Weight in tons . .	62·99	34·49	35·339	20·800	14·478	7·700	8·100	7·025	3·00	3·662	4·035	2·327	2·020	1·200	1·122	0·698	0·104
Firing Charge: Armour-piercing projectile . . . lb.	346	185	185	103·19	70·987	43	—	—	—	—	—	—	—	—	—	—	—
Firing Charge: Common Shell, H.E., lb.	279·9	185	185	—	70·987	—	32·79	30·64	—	14·66	9·589	9·479	10·319	6·50	3·02	3·571	0·529
Weight: Armour-piercing projectile . . . . . . lb.	997·2	494	494	260	200·39	103·5	—	—	50·5	—	—	—	—	—	—	—	—
Weight: Shell, H.E., lb. . . .	884·4	489·8	489·8	—	498·5	—	110·22	103·61	—	48·74	48·74	30·31	30·318	30·31	14·05	14·05	11·68
Weight: Shrapnel, . . . lb.	—	—	—	—	—	—	—	—	—	55·33	45·33	33·28	—	33·28	15·08	15·08	11·68
Bursting Charge: Armour-piercing projectile . . . lb.	16·63	4·37	4·37	—	2·332	—	—	—	—	—	—	—	—	—	—	—	—
Bursting Charge: Shell, H.E. . . lb.	53·13	29·86	29·86	—	11·706	—	5·996	7·528	—	2·711	2·711	2·866	—	2·866	1·102	1·102	0·782
Bursting Charge: Shrapnel, . . . lb.	—	—	—	—	—	—	—	—	—	0·65	0·65	0·474	—	0·474	0·236	0·236	0·165
Muzzle Velocity in ft. secs. .	2755·9	2788·77	2788·77	2743·20	2788·77	2786	2854	2723	2786	2788	2460	2788	2438·40	2460	2460	2460	1230
Muzzle Energy: Total tons per sq. inch	18·63	17·71	17·71	—	17·98	—	18·37	16·86	—	18·37	15·75	18·37	—	18·37	18·37	15·75	12·47

305/46 A.V., "Duilio and Cesare" class; 254/45 A., "S. Giorgio" class; 254/45 V., "Pisa"; 203/50 S.An. "Trento" class; 190/45 A.V., "S. Giorgio and Pisa" class; 152/53 An., "Colleoni" class; 152/45 S. "Duilio" class; 120/50 An., "Cesare" class; 120/50 A., "Quarto" 120/45 A., "Libia"; 100/47 R.M. "Trento and Colleoni" class.

Corrected to August, 1930.

JAPANESE NAVAL ORDNANCE

Date and Pattern of Gun.	KM. (1)	V. (2)	A. (3)	V. (4)	A. (5)	A. (6)	V. (7)	— (8)	A. (9)	Carried by
Desig. by Calibre, in cms.	40·6	35·6	20·3	15·2	15·2	15·2	15·2	14	12	(1) Mutsu Class.
Calibre, in inches	16	14	8	6	6	6	6	5·5	4·7	(2) Ise Class. Fuso Class. Kongo Class.
Total length, in feet	..	..	..	..	..	..	..	..	..	
Length of Bore, in ins.	..	..	..	..	..	..	..	..	..	(4) Kongo.
Length of Bore, in cals.	45	45	45	50	50	45	45	50	45	(5) Fuso Class. Kongo Class (except Kongo). Yahagi. Tone.
Total weight, in tons.	..	83	17·3	8	8·7	8·5	7·5	6·25	3·3	
Weight of Firing Charge, Armour-piercing Projectile . lb.	..	..	..	..	..	..	..	..	..	
Weight { Armour-piercing Projectile lb.	2190	1400	250	100	100	100	100	82	45	(8) Ise Class. Mutsu Class. Kuma Class. Tenryu Class.
Weight { Common Shell ,,	..	..	..	..	..	..	..	..	..	
Muzzle Velocity, in f.-s., A.P. Projectile	2780	2526	2740	3000	3000	2130	3000	2725	2988	(9) Tone. Yodo. Mogani.
Muzzle Energy in foot-tons	118,000	62,500	13,100	6300	6300	3165	6300	4250	2810	
Perforation at Muzzle,† wrought iron, inches	65	48·2	30·5	25·5	25·5	18·3	25·5	20·8	19·2	
Perforation Krupp Steel, 3000 yds.	13·8 at 10,970 metres	..	10½	6½	6½	4½	6½	..	2½	

† By Tressider's Formula.

Corrected to October, 1929.

SIZE AND FIGHTING QUALITIES OF BRITISH CAPITAL SHIPS OF DIFFERENT PERIODS.

Name.	Date of Completion.	Displacement.	Side Armour.	Speed.	Total Weight of Shot in One Round.	Collective Energy at Muzzle of One Round.
		tons.	in.	knots.	lb.	foot-tons.
Warrior	1861	9,210	4½-in. wrought-iron	14½	3,800	61,476
Hercules	1868	8,680	9-in. to 6-in. wrought-iron	14	5,400	70,200
Alexandra	1877	9,490	12-in. to 6-in. wrought-iron	15	5,426	71,400
Inflexible	1881	11,880	24-in. to 16-in. wrought-iron	13	6,936	123,120
Benbow	1888	10,600	18-in. compound	16·75	4,600	135,560
Royal Sovereign	1892	14,150	18-in. and 5-in. compound	17·5	5,800	159,610
Barfleur	1894	10,500	12-in. compound	18·5	2,450	67,670
Canopus	1900	12,950	6-in. hardened steel	18·25	4,600	178,720
Prince of Wales	1902	15,000	9-in. super-hardened steel	18·25	4,600	194,400
King Edward VII.	1905	16,350	9-in. hardened steel	19	6,100	271,800
Dreadnought	1906	17,900	11-in. hardened steel	21	8,800	487,100
Neptune	1911	20,600	12-in. hardened steel	21·5	8,900	545,000
Ajax	1913	25,000	12-in. hardened steel	21·5	14,500	625,000
Queen Elizabeth	1915	27,500	13-in. hardened steel	25	15,360	638,000
Royal Sovereign	1916	25,750	13-in. hardened steel	23	15,360	638,000
Hood	1920	41,200	13-in. hardened steel	31	15,360	638,000
Nelson	1927	35,000	13-in. hardened steel	23	18,432	847,458

PARTICULARS OF SUCCESSIVE LARGE BRITISH NAVAL GUNS, 1800 TO 1928

Year.	Type.	Weight.		Length.	Calibre.	Weight of Projectile.	Weight of Charge.	Muzzle Energy.	Penetration of Wrought-iron at 1000 yards range.
		tons.	cwt.	in.	in.	lb.	lb.	ft.-tons.	in.
1800	Cast-iron smooth-bore	2	12	114	6·4	32	10	400	—
1842	Ditto	4	15	—	8·12	68	16	700	—
1865	Woolwich wrought-iron	4	10	—	7	115	22	1,400	7
1870	Built-up muzzle-loader	38	0	200	12·50	810	200	13,900	17
1880	Ditto	80	0	321	16	1700	450	27,960	22½
1887	Built-up breech-loader	110	10	524	16·25	1800	960	54,390	32
1895	Wire-wound breech-loader	46	0	445·5	12	850	—	33,940	34·6
1900	Ditto	51	0	496·5	12	850	210	36,290	35·4
1905	Ditto	58	0	558	12	850	—	47,700	46·2
1912	Ditto	76	0	626	13·5	1400	297	60,237	*50
1914 to 1920	Ditto	100	0	650	15	1920	428	81,027	*56
1921	Ditto	117	0	720	16	2240	—	93,230	*57
1928	Ditto	108	0	742	16	2048	498	94,162	*60

* At muzzle. Guns of 18-in. calibre were fitted to one cruiser during the War, but were subsequently removed and used in monitors.

MERCHANT SHIPPING
REFERENCE SECTION.

BRITISH AND IRISH MERCHANT TONNAGE, AND UNITED STATES SEA-GOING MERCHANT TONNAGE, AS COMPARED WITH THE WORLD'S TOTAL MERCHANT FLEET.

Year.	World.	Great Britain and Ireland.	Percentage of British and Irish Tonnage to Total.	United States.*	Percentage of United States Tonnage to Total.
	Tonnage.	Tonnage.		Tonnage.	
1890	21,118,528	10,241,856	48·5	†	—
1891	22,912,753	10,585,747	46·2	†	—
1892	23,672,698	11,157,662	47·1	1,926,426	8·1
1893	24,236,865	11,563,997	47·7	1,964,359	8·1
1894	24,547,597	11,807,010	48·1	2,171,459	8·8
1895	25,086,199	12,117,957	48·3	2,164,753	8·6
1896	25,593,186	12,293,539	48·0	2,234,725	8·7
1897	25,889,044	12,403,409	47·9	2,326,838	9·0
1898	26,543,360	12,587,904	47·4	2,448,677	9·2
1899	27,613,851	12,926,924	46·8	1,872,245	6·8
1900	28,957,358	13,241,446	45·7	2,035,062	7·0
1901	30,479,971	13,656,161	44·8	2,231,925	7·3
1902	32,302,412	14,431,072	44·7	2,342,913	7·3
1903	33,501,855	14,889,571	44·4	2,480,981	7·4
1904	34,786,132	15,391,350	44·2	2,590,349	7·4
1905	35,998,180	15,803,180	43·9	2,649,411	7·4
1906	37,550,477	16,381,850	43·6	2,672,042	7·1
1907	39,435,788	16,999,668	43·1	2,728,711	6·9
1908	40,920,551	17,318,351	42·3	2,802,387	6·8
1909	41,447,825	17,377,936	41·9	2,791,282	6·7
1910	41,912,520	17,516,479	41·8	2,761,605	6·6
1911	43,144,909	17,872,697	41·4	2,808,684	6·5
1912	44,600,677	18,213,620	40·8	2,848,829	6·4
1913	46,970,113	18,696,237	39·8	2,998,457	6·4
1914	49,089,552	19,256,766	39·2	2,970,284	6·0
1915	49,261,769	19,541,368	39·7	3,522,933	7·1
1916	48,683,136	19,134,857	39·3	3,790,578	7·8
1917†	—	—	—	—	—
1918†	—	—	—	—	—
1919	50,919,273	16,555,471	32·5	10,782,170	21·2
1920	57,314,065	18,330,424	32·0	13,789,874	24·0
1921	61,974,653	19,571,554	31·6	14,697,088	23·7
1922	64,370,786	19,295,637	30·0	14,738,506	22·9
1923	65,166,238	19,281,549	29·6	14,597,035	22·4
1924	64,023,567	19,105,838	29·8	13,530,544	21·1
1925	64,641,418	19,440,711	30·1	12,948,632	20·0
1926	64,784,370	19,399,797	29·9	12,364,668	19·1
1927	65,192,910	19,309,022	29·6	12,070,050	18·5
1928	66,954,659	19,875,350	29·6	11,997,441	17·9
1929	68,074,312	20,166,331	29·6	11,835,176	17·4
1930	69,607,644	20,438,444	29·4	11,388,367	16·4

* Excluding American Great Lakes vessels.

† Figures not available.

NOTE.—Prior to 1919 the tonnages shown are the totals of gross tonnage for steam and motor vessels, and *net* tonnage for sailing vessels; in 1919 and subsequent years the figures are given in gross tonnage throughout.

NUMBER AND GROSS TONNAGE OF THE VESSELS OF 100 TONS TO EACH OF THE SEVERAL COUNTRIES OF THE

Flag.	June, 1913.†		June, 1919.		June, 1922.	
	No.	Tonnage.	No.	Gross Tonnage.	No.	Gross Tonnage.
Gt. Britain and Ireland	9,214	18,696,237	7,964	16,555,471	8,849	19,295,637
British Dominions .	2,073	1,735,306	2,141	2,052,404	2,472	2,746,883
British Empire . .	11,287	20,431,543	10,105	18,607,875	11,321	22,042,520
United States of America: Sea . .	2,696	2,998,457	4,350	10,782,170	4,886	14,738,506
United States of America: Lakes . .	627	2,382,690	506	2,257,786	495	2,247,690
United States of America: Philippine Islands .	77	46.489	73	51,817	99	76,264
United States of America: Total .	3,400	5,427,636	4,929	13,091,773	5,480	17,062,460
Argentine	308	214.835	215	154,441	216	181,555
Austria-Hungary . .	427	1,011,414	339	714,617	—	—
Belgium	172	304 386	152	313,276	275	579,477
Brazil	459	329,637	428	512,675	399	492,571
Chili	131	139,792	114	101,647	126	131,401
China	66	86,690	102	132,515	134	188,388
Cuba	59	61,536	51	47,295	65	62,677
Denmark	811	762,054	645	702,436	822	1,038,138
Esthonia	—	—	—	—	98	45,259
Finland	—	—	338	180,962	352	213,671
France	1,552	2.201.164	1,440	2,233,631	2,094	3,845,792
Germany	2,321	5,082,061	1,768	3,503,380	1,723	1,887,408
Greece	442	722,782	312	323,796	379	668,127
Holland	759	1,309.849	931	1,591,911	1,164	2,632,713
Italy	1,114	1,521,942	858	1,370,097	1,413	2,866,335
Japan *	1,037	1,500,014	1,418	2,325,266	2,026	3,586,918
Jugo-Slavia	—	—	‡	‡	‡	‡
Latvia	—	—	—	—	67	40,124
Norway	2,191	2,457,890	1,629	1,857,829	1,852	2,600,861
Peru	60	45,514	63	79,342	74	101,209
Portugal	208	120 579	227	261,212	286	285,878
Roumania	33	45.408	35	63,792	31	72,297
Russia	1,216	974,178	618	541,005	—	—
Spain	607	840 995	576	750,611	973	1,282,757
Sweden	1,436	1,047,270	1,263	992,611	1,345	1,115,375
Turkey	272	157,298	161	116,249	—	—
Other Countries and flag not recorded .	158	98,115	495	304.530	1,167	1,270,564
Total	30,591	46,970,113	29,255	50,919,273	33,935	64,370,786

* Japanese sailing vessels are not recorded in Lloyd's Register Book.

† In 1913 the figure shown is the total of the gross tonnage of steam and motor vessels, and the *net* tonnage of sailing vessels; in 1919 and subsequent years the figure is given in gross tons throughout.

‡ Figures included in total for "Other countries."

GROSS AND UPWARDS (STEAM, SAIL, AND MOTOR) BELONGING WORLD, AS RECORDED IN LLOYD'S REGISTER.

June, 1924.		June, 1926.		June, 1929.		June, 1930.	
No.	Gross Tonnage.	No.	Gross Tonnage.	No.	Gross Tonnage.	No.	Gross Tonnage.
8,559	19,105,838	8,369	19,399,797	8,172	20,166,331	8,238	20,438,444
2,449	2,772,662	2,477	2,870,327	2,507	2,949,816	2,516	2,943,170
11,008	21,878,500	10,864	22,270,124	10,679	23,116,147	10,754	23,381,614
4,508	13,530,544	4,001	12,364,668	3,696	11,835,176	3,530	11,388,367
524	2,361,464	529	2,433,049	576	2,541,938	575	2,558,479
96	64,959	97	81,044	111	104,908	118	98,962
5,128	15,956,967	4,627	14,878,761	4,383	14,482,022	4,223	14,045,808
215	199,185	242	234,848	311	296,236	335	323,025
—	—	—	—	—	—	—	—
251	560,597	225	507,473	244	529,043	243	553,037
375	464,734	361	482,308	391	560,680	388	558,777
147	181,092	138	179,712	119	154,563	131	193,131
168	248,108	201	299,806	218	319,224	216	319,315
70	59,523	72	61,735	66	45,270	‡	‡
764	1,035,943	771	1,081,146	701	1,055,867	705	1,088,006
108	45,897	115	49,025	116	60,383	126	72,089
322	207,952	363	232,792	348	298,323	355	313,143
1,857	3,498,233	1,769	3,490,606	1,662	3,378,663	1,651	3,530,879
2,003	2,953.671	1,986	3,110,918	2,127	4,092,552	2,157	4,229,235
409	761,210	467	924,944	516	1,266,685	546	1,390,899
1,082	2,556,417	1,109	2,564,904	1,339	2,939,067	1,401	3,086,315
1,299	2,832,212	1,401	3,240,630	1,380	3,284,660	1,380	3,331,226
2,055	3,842,707	2,087	3,967,617	2,059	4,186,652	2,060	4,316,804
‡	‡	137	195,787	153	281,396	161	302,481
69	46,281	87	67,783	108	150,159	125	195,527
1,753	2,505,393	1,844	2,841,905	1,807	3,224,493	1,916	3,668,289
38	70,821	46	79,068	38	62,160	39	64.345
279	301,308	285	280,116	269	246,368	272	265,265
39	71,183	37	68,173	34	68,647	35	68,650
397	338,792	370	323,284	379	440,506	347	532,096
950	1,239,521	924	1,163,008	877	1,161,591	891	1,231,737
1,405	1,254,550	1,380	1,338,089	1,385	1,510,125	1,417	1,623,938
134	105,148	174	136,796	189	172,096	190	177,199
563	727,702	468	637,799	584	690,734	649	744,814
32,956	64,023,567	32,615	64,784,370	32,482	68,074,312	32,713	69,607,644

* Japanese sailing vessels are not recorded in Lloyd's Register Book.

‡ Figures included in total for "Other Countries."

NUMBERS OF STEAMERS AND MOTORSHIPS OWNED BY THE PRINCIPAL MARITIME COUNTRIES ON JUNE 30, 1930, BY DIVISIONS OF AGE.

Country.	Numbers of Vessels owned of Various Ages.						Total Number of Vessels owned.	Percentage of Total Number of Ships under 5 years old.
	Under 5 years.	5 years and under 10 years.	10 years and under 15 years.	15 years and under 20 years.	20 years and under 25 years.	25 years and over.		
Gt. Brit. & Ireland	1,243	1,287	1,591	1,265	813	1,657	7,856	15·8
British Dominions	302	304	332	294	288	585	2,105	14·3
United States *	117	285	1,578	212	188	477	2,857	4·1
Denmark	71	154	132	64	57	165	643	11·0
France	105	240	361	217	215	363	1,501	7·0
Germany	266	568	315	255	272	462	2,138	12·4
Holland	287	227	310	205	131	221	1,381	20·8
Italy	112	151	172	128	120	422	1,105	10·1
Japan	197	274	792	171	158	468	2,060	9·6
Norway	288	291	446	231	190	459	1,905	15·1
Spain	59	73	215	45	46	357	795	7·4
Sweden	66	117	213	115	149	646	1,306	5·5
Other Countries	345	237	518	426	508	1,768	3,802	9·1
World Total*	3,458	4,208	6,975	3,628	3,135	8,050	29,454	11·7

* Excluding American Great Lakes vessels.

NUMBERS OF STEAMERS AND MOTORSHIPS OWNED BY THE PRINCIPAL MARITIME COUNTRIES ON JUNE 30, 1930, BY DIVISIONS OF GROSS TONNAGE.

Country.	Numbers of Vessels Owned of Various Gross Tonnages.										Total Number of Vessels owned.	Percentage of Total Number of Vessels of 6000 gross tons and over.
	100 tons and under 500 tons.	500 tons and under 1000 tons.	1000 tons and under 2000 tons.	2000 tons and under 4000 tons.	4000 tons and under 6000 tons.	6000 tons and under 8000 tons.	8000 tons and under 10,000 tons.	10,000 tons and under 15,000 tons.	15,000 tons and under 20,000 tons.	20,000 tons and over.		
Gt. Brit. & Ireland	3,361	681	767	757	1,318	556	187	143	54	32	7,856	12·4
British Dominions	1,052	297	325	245	121	41	12	9	3	—	2,105	3·1
United States *	658	160	187	511	708	477	99	44	7	6	2,857	22·2
Denmark	188	81	210	99	39	13	10	3	—	—	643	4·0
France	642	118	157	251	185	67	50	21	5	5	1,501	9·9
Germany	973	306	258	228	167	122	54	15	6	9	2,138	9·6
Holland	654	72	163	196	116	109	49	12	8	2	1,381	13·0
Italy	343	93	93	204	230	104	21	7	2	8	1,105	12·8
Japan	786	231	257	380	255	103	29	16	3	—	2,060	7·3
Norway	712	195	422	228	208	102	27	9	2	—	1,905	7·3
Spain	373	74	94	190	47	9	3	5	—	—	795	2·1
Sweden	585	175	347	112	63	11	8	1	3	1	1,306	1·8
Other Countries	1,573	502	627	677	328	58	31	6	—	—	3,802	2·5
World Total *	11,900	2,985	3,907	4,078	3,785	1,772	580	291	93	63	29,454	9·5

* Excluding American Great Lakes vessels.

NUMBERS OF VESSELS CLASSED BY VARIOUS CLASSIFICATION SOCIETIES.*

Society.	1913.	1919.	1921.	1923.	1925.	1928.	1930.
Lloyd's Register	10,466	9175	10,154	10,296	9973	10,077	10,471
British Corporation	876	1002	1190	1306	1253	1417	1595
American Bureau of Shipping							
Record of American and Foreign Shipping	846	926	2216	2392	2131	1928	1857
Gt. Lakes Register	572	442	392	416	383	383	353
Bureau Veritas	5165	5706	6387	4998	5135	5097	5196
Norske Veritas	1604	955	1109	1242	1220	1307	1330
Registro Italiano	1442	699	1280	1872	1826	1693	1885
Germanischer Lloyd	2848	†	2219	2799	2855	2914	2913

* Many vessels, of course, are not exclusively classed in one Register.

† No data available.

MARINE ENGINES UNDER CONSTRUCTION IN THE WORLD

(Recorded by Lloyd's Register of Shipping as at the end of September, 1930).

Country in which building.	Steam Engines.				Oil Engines.		Total.	
	Reciprocating.		Turbines.					
	No.	I.H.P.	No.	S.H.P.	No.	I.H.P.	No.	H.P.
Gt. Britain & Ireland	160	216,475	27	225,965	88	332,785	275	775,225
British Dominions	3	21,500	—	—	2	290	5	21,790
Belgium	—	—	2	31,000	4	6,800	6	37,800
Denmark	6	9,400	—	—	28	124,615	34	134,015
France	6	12,500	5	88,000	5	50,700	16	151,200
Germany	37	44,475	3	10,350	53	187,070	93	241,895
Holland	9	7,970	—	—	28	131,990	37	139,960
Italy	5	5,700	2	208,000	19	102,240	26	315,940
Japan	2	1,750	—	—	12	65,185	14	66,935
Norway	17	17,350	—	—	3	8,360	20	25,710
Russia	†	†	†	†	†	†	†	†
Sweden	8	10,865	—	—	90	90,189	98	101,054
Switzerland	—	—	—	—	25	55,550	25	55,550
United States	3	7,200	15	194,000	35	41,314	53	242,514
Other Countries	10	10,700	—	—	1	2,500	11	13,200
Total	266	365,885	54	757,315	393	1,199,588	713	2,322,788

The horse-power is compiled from figures furnished by the engine makers.

† No returns received.

NUMBER AND TONNAGE OF MOTORSHIPS (EXCLUDING VESSELS FITTED WITH AUXILIARY MOTORS) OWNED BY VARIOUS NATIONS.

	June, 1923.		June, 1925.		June, 1927.		June, 1930.	
	No.	Gross tonnage.	No.	Gross tonnage.	No.	Gross tonnage.	No.	Gross tonnage.
Gt. Brit. & Ireland	139	374,873	220	733,734	291	1,167,301	453	2,246,166
British Dominions	44	14,084	69	37,272	100	94,959	167	174,939
United States *	97	139,786	132	216,889	188	349,786	258	600,453
Denmark	40	132,542	56	171,964	68	219,246	89	341,509
France	34	27,958	27	34,824	26	34,377	46	139,186
Germany	45	84,528	78	233,612	112	315,141	183	537,261
Holland	52	66,577	64	124,262	85	192,807	272	534,373
Italy	34	61,374	41	124,901	64	363,822	112	494,709
Japan	20	4,375	42	41,376	73	99,290	157	385,097
Norway	130	177,071	156	324,567	197	580,551	292	1,279,847
Spain	8	13,378	17	18,442	25	45,927	47	117,940
Sweden	103	173,697	120	259,900	119	295,646	143	459,099
Other countries	73	45,688	88	67,501	120	207,718	244	472,960
World's total *.	819	1,315,931	1,110	2,389,244	1,468	3,966,571	2,463	7,783,539

* Excluding American Great Lakes vessels.

COMPARATIVE TABLE OF STEAMSHIP AND MOTORSHIP TONNAGE (INCLUDING AUXILIARIES) OWNED BY VARIOUS COUNTRIES, AS AT JUNE, 1930.

Country.	Steamships.			Motorships.		
	No.	Gross tonnage.	Percentage of total steamship and motorship tonnage.	No.	Gross tonnage.	Percentage of total steamship and motorship tonnage.
Gt. Britain and Ireland	7,329	18,060,046	88·9	527	2,261,874	11·1
British Dominions .	1,843	2,588,376	92·9	262	199,814	7·1
British Empire . .	9,172	20,648,422	89·3	789	2,461,688	10·7
United States * . .	2,565	10,026,335	94·2	292	619,315	5·8
Denmark	496	718,130	67·0	147	353,391	33·0
France	1,420	3,323,680	95·8	81	146,911	4·2
Germany	1,719	3,615,149	86·1	419	583,947	13·9
Holland	994	2,526,028	82·0	387	552,972	18·0
Italy	932	2,750,555	84·3	173	511,367	15·7
Japan	1,781	3,910,613	90·6	279	406,191	9·4
Norway	1,555	2,373,165	64·8	350	1,290,072	35·2
Spain	697	1,078,719	89·4	98	128,374	10·6
Sweden	1,047	1,116,702	70·0	259	477,611	30·0
Other countries . .	3,393	5,415,020	91·0	409	531,798	9·0
World's Total* .	26,300	59,927,467	88·1	3,696	8,096,337	11·9

* Excluding American Great Lakes vessels.

NUMBER AND GROSS TONNAGE OF MOTORSHIPS OF OVER 8,000 TONS GROSS, OWNED BY VARIOUS NATIONS, AS AT JUNE, 1930.

Country.	8,000 and under 10,000 tons gross.		10,000 and under 15,000 tons gross.		15,000 tons gross and above.		Total over 8,000 tons gross.	
	No.	Gross tonnage.	No.	Gross tonnage.	No.	Gross tonnage.	No.	Gross tonnage.
Great Britain and Ireland . . .	42	377,649	18	214,256	11	216,200	71	808,105
British Dominions.	4	35,224	4	45,432	1	19,086	9	99,742
United States . .	15	132,509	6	66,008	—	—	21	198,517
Denmark . . .	7	59,991	1	10,110	—	—	8	70,101
France	3	26,222	1	10,193	2	38,543	6	74,958
Germany . . .	7	63,647	3	38,965	2	33,431	12	136,043
Holland. . . .	18	161,634	4	47,580	5	86,658	27	295,872
Italy	7	62,147	2	23,387	3	80,560	12	166,094
Japan	6	54,341	5	56,740	3	51,400	14	162,481
Norway . . .	22	201,930	—	—	1	16,734	23	218,664
Russia	2	16,432	—	—	—	—	2	16,432
Spain	—	—	1	11,637	—	—	1	11,637
Sweden . . .	8	72,141	—	—	4	68,651	12	140,792
Other countries .	13	114,393	1	10,353	—	—	14	124,746
World's Total .	154	1,378,260	46	534,661	32	611,263	232	2,524,184

NOTABLE MOTORSHIPS.

Date.	Name.	Gross tonnage.	Dimensions. (ft.)	Owners.	Builders.	Machinery makers.	Type of engine.	Cycle.	No. of eng.	Total B.H.P.	Revs. per min.
1912	Juno	2,345	257·6 × 43·1 × 18·6	Nederl. Indische Tankstoomboot Maats.	Nederl. Schs. Maats.	Werkspoor	Werkspoor	4 single act.	1	1,100	125
1918	Aba	7,937	450·5 × 55·8 × 36·6	Elder Dempster	Barclay, Curle and Co.	Harland & Wolff	B. & W.	4 single act.	2	5,250	115
1922	Pacific Commerce	5,089	420·0 × 54·0 × 25·0	Furness Withy	Wm. Doxford and Sons	Doxford	Doxford	2 opposed pistons	1	2,700	77
1923	Brazza	10,193	453·1 × 59·1 × 36·1	Chargeurs Réunis	Atel. & Ch. de la Loire	Sulzer	Sulzer	2 single act.	2	3,400	85
1924	Dolius	5,994	407·0 × 52·2 × 28·4	A. Holt & Co.	Scott's S.B. & E. Co.	Scott's S.B. & E. Co.	Still	2 double act.	2	2,500	120
1924	Aorangi	17,491	580·1 × 72·2 × 43·4	Union S.S. Co. of New Zealand	Fairfield S.B. & E. Co.	Fairfield S.B. & E. Co.	Sulzer	2 single act.	4	13,000	135
1925	Gripsholm	17,716	553·0 × 74·4 × 37·7	Swedish-America Line	Armstrong Whitworth & Co.	Burmeister & Wain	B. & W.	4 double act.	2	13,500	125
1925	Asturias	22,071	630·5 × 78·5 × 40·5	Royal Mail	Harland & Wolff	Harland & Wolff	B. & W.	4 double act.	2	16,500	125
1926	Carnarvon Castle	20,063	630·7 × 73·5 × 41·5	Union Castle	Harland & Wolff	Harland & Wolff	B. & W.	4 double act.	2	13,000	105
1926	Saturnia	23,940	631·4 × 79·8 × 29·5	Cosulich Line	C.N. Triestino	Stab. Tec. Triestino	B. & W.	4 dbl. act. with super chargers	2	20,000	125
1926	Vulcania	23,970	631·4 × 79·8 × 24·4	Cosulich Line	C.N. Triestino	Stab. Tec. Triestino	B. & W.	4 dbl. act. with super chargers	2	20,000	125
1927	Augustus	32,650	710·9 × 82·8 × 46·5	Nav. Gen. Italiana	Soc. Anon. Ansaldo	M.A.N. & Cant. Off. Savoia	M.A.N.	2 double act.	4	25,000	120
1927	Bermuda	19,086	525·9 × 74·1 × 39·6	Bermuda & W. Indies S.S. Co.	Workman, Clark & Co.	Doxford	Doxford	2 opposed pistons	4	11,200	110
1928	Kungsholm	20,223	594·9 × 78·2 × 37·8	Swedish-America Line	Blohm & Voss	Burmeister & Wain	B. & W.	4 double act.	2	15,000	100
1930	Britannic	26,943	682·6 × 82·4 × 48·6	White Star Line	Harland & Wolff	Harland & Wolff	B. & W.	4 double act.	2	20,000	110

NUMBER AND TONNAGE OF TANKERS OWNED BY VARIOUS NATIONS.*

	June, 1923.		June, 1925.		June, 1927.		June, 1928.		June, 1929.		June, 1930.	
	No.	Tons gross.	No.	Tons gross.	No.	Tons gross.	No.	Tons gross.	No.	Tons gross.	No.	Tons gross.
Great Britain and Ireland	312	1,691,257	315	1,708,978	352	1,934,186	377	2,101,869	388	2,165,208	380	2,167,297
British Dominions	39	196,639	34	185,836	34	181,041	39	229,098	39	227,969	39	235,098
British Empire	351	1,887,896	349	1,894,814	386	2,115,227	416	2,330,967	427	2,393,177	419	2,402,395
United States	399	2,497,625	374	2,281,324	374	2,293,539	383	2,375,121	381	2,374,358	389	2,419,977
Belgium	7	36,471	7	34,982	6	39,533	7	43,291	8	46,305	9	59,860
Denmark	2	11,561	2	9,647	3	12,660	8	52,562	9	59,475	9	59,475
France	19	105,233	28	151,089	27	146,872	27	150,017	29	169,298	32	192,021
Germany	9	36,675	12	55,754	20	94,258	24	113,964	26	125,387	28	136,975
Holland	35	115,804	46	148,109	58	199,110	67	228,272	74	261,255	74	270,405
Italy	18	89,399	28	128,904	45	205,871	54	239,152	57	255,020	70	318,699
Japan	10	64,036	8	47,137	9	47,531	12	64,287	13	76,911	17	101,114
Norway	33	178,368	42	243,455	63	403,812	88	564,210	117	781,575	154	1,059,550
Spain	8	30,604	8	30,648	8	30,602	8	30,602	8	30,602	7	27,355
Sweden	2	6,599	2	4,873	3	16,270	6	37,541	7	49,127	12	93,986
Other countries	24	100,652	33	146,894	48	241,801	67	314,277	80	365,432	88	394,556
World's Total	917	5,160,923	939	5,177,630	1,050	5,847,086	1,167	6,544,263	1,236	6,987,922	1,308	7,536,368

* Excluding Tankers of less than 1,000 tons gross.

NUMBER AND TONNAGE OF MERCHANT VESSELS LAUNCHED.*

	1913.		1919.		1923.		1925.		1929.		1930 (1st 9 months).	
	No.	Gross Tonnage.	No.	Gross Tonnage.	No.	Gross Tonnage.	No.	Gross Tonnage.	No.	Gross Tonnage.	No.	Gross Tonnage.
Gt. Britain and Ireland .	688	1,932,153	612	1,620,442	222	645,651	342	1,084,633	489	1,522,623	382	1,191,307
British Dominions . . .	77	26,744	235	298,495	41	37,072	47	32,220	47	21,327	58	36,091
United States † . . .	182	228,232	852	3,579,826	69	96,491	94	78,766	59	100,632	85	165,890
Denmark	31	40,932	46	37,766	24	49,479	21	73,268	34	111,496	27	91,167
France	89	176,095	34	32,633	27	96,644	35	75,569	16	81,607	13	79,332
Germany	162	465,226	No returns.		109	345,062	121	406,374	85	249,077	70	192,592
Holland	95	104,296	100	137,086	35	65,632	47	78,823	77	186,517	41	118,976
Italy	38	50,356	32	82,713	21	66,523	31	142,046	32	71,497	31	60,489
Japan	152	64,664	133	611,883	44	72,475	23	55,784	40	164,457	25	122,337
Norway	74	50,637	82	57,578	48	42,619	48	28,805	51	39,604	42	43,229
Spain	12	8,488	41	52,609	7	4,488	1	127	8	37,023	10	13,732
Sweden	25	18,524	53	50,971	10	20,118	17	53,750	29	107,246	21	96,553
Other Countries	88	96,724	36	26,755	27	20,410	17	19,371	38	62,859	31	49,149
World's Total . .	1713	3,282,071	2256	6,588,757	684	1,562,664	844	2,129,536	1005	2,755,965	836	2,260,844

* Figures given include all steamers, motorships, and sailing vessels of 100 gross tons and upwards.

† Excluding vessels built at ports on the Great Lakes of America.

MERCHANT VESSELS UNDER CONSTRUCTION.*

	1913.		1919.		1925.		1929.		1930.	
	No.	Gross Tonnage.	No.	Gross Tonnage.	No.	Gross Tonnage.	No.	Gross Tonnage.	No.	Gross Tonnage.
Gt. Britain and Ireland .	508	1,987,254	781	2,816,773	257	1,009,155	341	1,448,355	258	1,116,746
British Dominions . . .	67	36,923	151	254,632	23	32,047	32	33,973	20	13,631
United States †	60	121,304	641	3,161,714	36	69,866	26	96,010	41	212,974
Denmark	11	25,257	45	68,074	18	70,760	19	80,855	20	97,335
France	42	249,595	64	174,736	36	150,220	19	135,776	22	209,307
Germany	92	535,555	No returns.		73	306,626	66	235,499	42	194,200
Holland	50	128,730	113	288,042	44	127,775	55	224,029	45	184,920
Italy	19	56,126	108	285,928	40	269,802	36	69,834	26	188,384
Japan	17	64,905	64	299,600	13	53,270	23	156,810	17	104,250
Norway	45	41,746	73	83,941	22	19,770	25	32,370	22	31,650
Russia	18	12,128	No returns.		No returns.		37	112,073	No returns.	
Spain	4	2,830	26	90,705	5	11,427	13	45,137	18	61,136
Sweden	13	16,665	64	101,217	20	71,580	31	111,427	26	125,660
Other Countries	22	89,036	49	60,353	22	14,607	16	19,191	23	28,843
World's Total . .	968	3,368,054	2179	7,685,715	609	2,206,905	739	2,801,339	580	2,569,036

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* The figures give the number and aggregate gross tonnage of steamers, motorships, and sailing vessels under construction on September 30 of each year.

† Excluding vessels building at ports on the Great Lakes of America.

ANNUAL MERCHANT SHIPPING LOSSES OF THE WORLD.*

	1913.			1919.			1924.			1927.			1928.			1929.		
	No.	Tonnage.	% of Tonnage owned.	No.	Tonnage.	% of Tonnage owned.	No.	Tonnage	% of Tonnage owned.	No.	Tonnage.	% of Tonnage owned.	No.	Tonnage.	% of Tonnage owned.	No.	Tonnage.	% of Tonnage owned.
Gt. Brit. & Ireland	113	199,453	1·07	99	151,653	·92	74	111,207	·58	59	66,348	·34	72	120,446	·60	61	113,420	·56
British Dominions	37	20,091	1·16	89	52,539	2·56	61	41,325	1·49	41	24,143	·84	31	27,095	·93	50	41,253	1·40
United States ‡ .	91	71,469	2·38	115	150,272	1·15	64	87,418	·65	57	104,992	·87	44	77,010	·64	44	78,103	·66
Denmark . . .	13	6,583	·86	15	5,295	·75	13	14,198	1·37	6	5,133	·48	3	3,053	·29	10	11,066	1·05
France	30	34,506	1·57	34	40,420	1·81	25	27,726	·79	26	35,353	1·02	27	56,506	1·19	32	33,291	·99
Germany . . .	31	56,379	1·11	50	24,167	—	26	23,095	·78	18	27,490	·82	23	15,568	·41	29	34,243	·84
Holland . . .	4	1,340	·10	23	11,550	·73	1	801	·03	6	21,403	·81	5	7,083	·29	4	2,689	·09
Italy	26	26,881	1·77	8	3,096	·23	16	38,810	1·37	23	57,270	1·64	25	30,706	·90	26	38,226	1·16
Japan†	25	25,514	1·7	38	41,418	1·77	42	70,933	1·85	42	76,212	1·89	35	69,416	1·68	33	67,032	1·60
Norway . . .	61	60,648	2·47	41	44,132	2·37	22	23,786	·95	29	21,571	·76	28	23,721	·80	30	25,460	·79
Spain	13	15,928	1·89	16	9,752	1·30	10	10,181	·82	10	10,424	·90	7	14,113	1·21	9	16,805	1·45
Sweden	30	17,327	1·65	38	29,021	2·92	16	16,627	1·33	11	10,390	·76	12	16,256	1·12	11	8,236	·55
Other Countries .	36	42,686	—	65	54,719	—	52	65,438	—	53	56,663	—	57	70,088	—	64	86,302	—
World's Total .	542	608,235	—	635	622,805	—	422	531,545	—	381	517,392	—	369	531,061	—	403	556,126	—

* Figures refer to steam, motor, and sailing vessels of 100 gross tons and over totally lost, condemned, etc. The tonnage given is gross for steamers and motorships, and net for sailing ships up to and including the returns for 1919; in subsequent returns the tonnage is gross for steamers, motorships, and sailing ships.

† Japanese sailing vessels not included.

‡ Excluding ships trading on the Great Lakes of America,

GENERAL PARTICULARS OF LARGE SHIPS OF VARIOUS NATIONALIITES.

Name of Ship	AQUITANIA.	MAURETANIA.	LEVIATHAN (ex Vaterland).	BERENGARIA (ex Imperator).	MAJESTIC (ex Bismarck).	BREMEN.
Builders	J. Brown & Co., Ltd., Clydebank	Swan, Hunter & W. Richardson, Ltd., Wallsend-on-Tyne	Blohm & Voss, Hamburg	Vulcan Co., Hamburg	Blohm & Voss, Hamburg	Akt. Ges. Weser, Bremen
Owners or Managers	Cunard Co.	Cunard Co.	United States Lines	Cunard Co.	White Star Line	Norddeutscher Lloyd
Year when built	1914	1907	1914	1912	1921	1929
Length over all	902 ft.	787 ft.	950 ft.	906 ft. 8½ in.	956 ft.	938 ft.
Length between perps. (or moulded)	865 ft.	760 ft.	907 ft.	883 ft. 6 in.	912 ft.	888 ft.
Breadth	97 ft.	88 ft.	100 ft. 3½ in.	98 ft. 3½ in.	100 ft.	101 ft. 8 in.
Depth (moulded)	64 ft. 6 in.	60 ft. 6 in.	63 ft.	63 ft.	64 ft.	45 ft. 6½ in. to D. Deck
Gross Tonnage	45,647	30,696	59,957	52,226	56,621	51,656
Draught	36 ft. 2 in.	36 ft. 2½ in.	38 ft. 6 in.	39 ft.	38 ft. 11¼ in.	32 ft.
Displacement (tons)	53,176	41,590	63,100	63,060	64,000	51,830
Number of Passengers—						
First Class	744	524	672 †	813	1000	800
Second Class	623	438	535	702	545	800§
Third Class	1226	796	2392 ‡	1327	2392	600
Machinery Makers	John Brown & Co., Ltd.	Wallsend Slipway and Engineering Co., Ltd.	Blohm & Voss, Hamburg	Vulcan Co., Hamburg	Blohm & Voss, Hamburg	Akt. Ges. Weser, Bremen
Type of Engines	Stm. Turbs. driving 4 Screws	Stm. Turbs. driving 4 Screws	Stm. Turbs. driving 4 Screws	Stm. Turbs. driving 4 Screws	Stm. Turbs. driving 4 Screws	Stm. Turbs. driving 4 Screws
Revs. per Minute	180	180	180–190	180	180	182
Total Shaft H.P.	60,000	75,000	—	76,250	66,000	92,500
No. and Type of Boilers	21 Cylindrical (double ended)	25 Cylindrical (23 double-ended, 2 single-ended)	46 Water Tube	46 Water Tube	48 Water Tube	20 Water Tube (11 double-ended, 9 single-ended)
No. of Furnaces	168 (oil-fired)	192 (oil-fired)	138 (oil fired)	46 (oil-fired)	48 (oil-fired)	(oil-fired)
Steam Pressure (lb. per sq. in.)	195	195	235	228	260	330
Total Heating Surface (sq. ft.)	138,595	167,520	210,440	203,000	220,000	183,458
Total Grate Area (sq. ft.)	3541	4048	3843	3763	4013	—
System of Draught	Howden's	Howden's	Howden's	Howden's	Forced	Forced
Speed on Service (knots)	23	25·5 *	23	23	25	26

* This figure is the mean speed attained for 27 consecutive runs across the North Atlantic in one year, covering a total distance of 77,500 nautical miles.

† 80 Berths for Servants and 110 Pullman Berths in addition.

‡ Including 1542 Fourth Class Passengers.

§ Includes 300 Tourist Class.

LARGEST MERCHANT VESSELS OF THE WORLD.

A list of all vessels of 10,000 tons gross or more arranged in order of gross tonnage.

(T.= turbine engines; M.= motor engines; T. & R.= turbines & reciprocating engines; T.E.= turbo-electric.)

Gross tonnage.	Name.	Speed † (knots.)	Date built.	Flag.	Owners.	L.* (ft.)	B*. (ft.)	D.* (ft.)
59,957	Leviathan (T.)	25	1914	U.S.	United States Lines	907·6	100·3	58·0
56,621	Majestic (T.)	25	1921	Br.	White Star Line	915·5	100·1	58·2
52,226	Berengaria (T.)	23	1912	Br.	Cunard Line	883·6	98·3	57·2
51,656	Bremen (T.)	26	1929	Ger.	Norddeutscher Lloyd	898·7	101·9	48·1
49,746	Europa (T.)	26	1928	Ger.	Norddeutscher Lloyd	890·2	102·1	48·0
46,439	Olympic (T. & R.)	22½	1911	Br.	White Star Line	852·5	92·5	59·5
45,647	Aquitania (T.)	23	1914	Br.	Cunard Line	868·7	97·0	49·7
43,153	Ile de France (T.)	23	1926	Fr.	C.G.T. (French Line)	763·7	92·0	55·9
40,945	L'Atlantique (T.)	—	1930	Fr.	Cie. de Nav. Sud-Atlantique	713·6	91·8	57·7
42,000	Empress of Britain (T.)	—	1930	Br.	Canadian Pacific	733·3	97·8	37·0
34,569	Paris (T.)	21	1921	Fr.	C.G.T. (French Line)	735·4	85·3	59·1
34,351	Homeric	20	1922	Br.	White Star Line	751·0	83·3	48·6
32,650	Augustus (M.)	19	1927	Ital.	Nav. Gen. Italiana	666·3	82·8	47·2
32,583	Roma (T.)	21	1926	Ital.	Nav. Gen. Italiana	664·7	82·6	51·5
32,565	Columbus	21	1922	Ger.	Norddeutscher Lloyd	749·6	83·1	49·4
30,696	Mauretania (T.)	25	1907	Br.	Cunard Line	762·2	88·0	57·1
29,511	Statendam (T.)	18	1926	Holl.	Holland-Amerika Line	670·4	81·4	49·4
27,561	Cap Arcona (T.)	20	1927	Ger.	Hamburg Sud-Amerika Line	643·6	84·6	41·9
27,132	Belgenland (T. & R.)	17½	1917	Br.	F. Leyland & Co.	670·4	78·4	44·7
26,943	Britannic (M.)	—	1930	Br.	White Star Line	683·6	82·4	48·6
26,032	Empress of Japan (T.)	—	1930	Br.	Canadian Pacific	644·0	83·8	44·5
25,661	Conte Grande (T.)	21	1928	Ital.	Lloyd Sabaudo	652·2	78·3	27·2
25,082	Lafayette (M.)	18	1929	Fr.	C.G.T. (French Line)	574·1	77·0	50·0
24,679	Adriatic	18	1906	Br.	White Star Line	709·2	75·5	52·6
24,416	Conte Biancamano (T.)	20	1925	Ital.	Lloyd Sabaudo	650·9	76·1	27·5
24,281	Duilio (T.)	21	1923	Ital.	Nav. Gen. Italiana	602·4	76·3	46·3
24,149	Rotterdam	17	1908	Holl.	Holland-Amerika Line	650·5	77·4	43·5
23,970	Vulcania (M.)	19	1927	Ital.	Cosulich Line	599·0	79·5	46·5
23,940	Saturnia (M.)	19	1927	Ital.	Cosulich Line	606·2	79·8	46·5
23,884	Baltic	17	1904	Br.	White Star Line	709·2	75·6	52·6
23,788	George Washington	18½	1908	U.S.	United States Lines	699·1	78·2	50·1
23,769	France (T.)	20	1912	Fr.	C.G.T. (French Line)	690·1	75·6	48·5
22,181	Alcantara (M.)	17½	1926	Br.	Royal Mail	630·5	78·5	40·5
22,071	Asturias (M.)	17½	1925	Br.	Royal Mail	630·5	78·5	40·5
21,998	Minnetonka (T.)	16½	1924	Br.	Atlantic Transport Line	600·8	80·4	49·4
21,867	New York (T.)	19½	1927	Ger.	Hamburg-Amerika Line	602·5	79·0	42·1
21,833	Empress of Australia (T.)	18	1914	Br.	Canadian Pacific	589·9	75·2	41·5
21,716	Minnewaska (T.)	16½	1923	Br.	Atlantic Transport Line	600·8	80·4	49·4
21,691	Hamburg (T.)	19	1925	Ger.	Hamburg-Amerika Line	602·5	78·7	51·6
21,657	Giulio Cesare (T.)	19	1921	Ital.	Nav. Gen. Italiana	602·4	76·5	46·3
21,517	Empress of Canada (T.)	20	1922	Br.	Canadian Pacific	627·0	77·9	42·2
21,329	America	17	1905	U.S.	United States Lines	668·8	74·3	47·8
21,227	Cedric	17	1903	Br.	White Star Line	680·9	75·3	44·1
21,000	Warwick Castle (M.)	—	1930	Br.	Union Castle Line	651·5	75·5	37·4
20,952	Mooltan (T. & R.)	17½	1923	Br.	P. & O.	600·8	73·4	48·6
20,931	Albert Ballin (T.)	19	1923	Ger.	Hamburg-Amerika Line	602·4	78·7	41·9
20,837	Maloja	16½	1923	Br.	P. & O.	600·8	73·4	48·6
20,773	Virginia (T.E.)	18	1928	U.S.	American Line S.S. Corp.	586·4	80·3	52·0
20,607	Deutschland (T.)	19	1923	Ger.	Hamburg-Amerika Line	602·5	78·7	51·6
20,526	California (T.E.)	18	1928	U.S.	American Line S.S. Corp.	574	80	52·0
20,526	Pennsylvania (T.E.)	—	1929	U.S.	American Line S.S. Corp.	586·0	80·3	20·5
20,517	Cap Polonio (T. & R.)	18	1914	Ger.	Hamburg Sud-Amerika Line	637·8	72·4	39·6
20,277	Carinthia (T.)	16½	1925	Br.	Cunard Line	600·7	73·8	40·7
20,223	Kungsholm (M.)	17	1928	Swed.	Svenska-Amerika Line	594·9	78·2	37·8
20,175	Franconia (T.)	16½	1923	Br.	Cunard Line	601·3	73·7	40·6
20,123	Duchess of Bedford (T.)	17½	1928	Br.	Canadian Pacific	581·9	75·2	41·8
20,119	Duchess of Atholl (T.)	17½	1928	Br.	Canadian Pacific	580·0	75·3	41·8
20,109	Winchester Castle (M.)	—	1930	Br.	Union Castle Line	631·6	75·5	37·5
20,063	Carnarvon Castle (M.)	18	1926	Br.	Union Castle Line	630·7	73·5	37·5
20,032	Otranto (T.)	20	1925	Br.	Orient Line	632·0	75·2	32·9
20,022	Duchess of Richmond (T.)	18	1928	Br.	Canadian Pacific	581·9	75·2	41·7
20,021	Duchess of York (T.)	18	1929	Br.	Canadian Pacific	581·9	75·2	41·7
20,001	Oronsay (T.)	20	1925	Br.	Orient Line	633·6	75·2	33·0
19,970	Orontes (T.)	20	1929	Br.	Orient Line	632·0	75·2	33·0
19,941	Orford (T.)	20	1927	Br.	Orient Line	632·2	75·4	33·1
19,802	Reliance (T. & R.)	17	1920	Ger.	Hamburg-Amerika Line	590·4	72·3	39·7
19,782	Caronia	18	1905	Br.	Cunard Line	650·0	72·2	40·2

* The registered dimensions are measured as follows: Length from fore part of stem at extreme top to aft side of head of stern post, or centre of rudder stock if a balanced rudder is fitted; Breadth is taken to outside of plating; Depth from top of beam at centre line of tonnage deck amidships to ceiling. If there is no ceiling it is measured to the tank top. If there are more than two decks, the tonnage deck is the second deck, counting from below.

† The speeds shown in this Table are as given by the owners.

LARGEST MERCHANT VESSELS OF THE WORLD—*continued*.

Gross tonnage.	Name.	Speed † (knots).	Date built.	Flag.	Owners.	L.* (ft.)	B.* (ft.)	D.* (ft.)
19,777	Orama (T.)	20	1924	Br.	Orient Line	632·0	75·2	32·9
19,761	Scythia (T.)	16½	1920	Br.	Cunard Line	600·7	73·8	40·7
19,695	Laconia (T.)	16½	1922	Br.	Cunard Line	601·3	73·7	40·6
19,692	Resolute (T. & R.)	17	1920	Ger.	Hamburg-Amerika Line	590·4	72·2	40·2
19,648	Viceroy of India (T.E.)	18	1928	Br.	P. & O.	582·7	76·0	45·5
19,597	Samaria (T.)	16½	1921	Br.	Cunard Line	601·5	73·7	40·7
19,566	Carmania (T.)	18	1905	Br.	Cunard Line	650·4	72·2	40·0
19,361	Monticello	23½	1902	U.S.	U.S. Shipping Board	684·3	72·3	40·2
19,086	Bermuda (M.)	18	1927	U.S.	Bermuda & W. Indies S.S. Co.	525·9	74·1	39·6
19,040	J. van Oldenbarnevelt (M.)	17	1929	Holl.	Nederland Stoom. Maats.	580·0	74·6	47·3
19,023	Arundel Castle (T.)	18	1921	Br.	Union Castle Line	630·5	72·5	41·5
18,967	Windsor Castle (T.)	18	1922	Br.	Union Castle Line	632·4	72·5	41·6
18,940	Albertic	16	1923	Br.	White Star Line	590·8	72·0	37·6
18,765	Conte Verde (T.)	19	1923	Ital.	Lloyd Sabaudo	570·2	74·2	35·9
18.724	Laurentic (T. & R.)	17	1927	Br.	White Star Line	578·2	75·4	40·6
18,565	Lapland	17	1908	Br.	F. Leyland & Co.	605·8	70·4	37·4
18,495	Ceramic (T. & R.)	16	1913	Br.	White Star Line	655·1	69·4	43·8
18,452	Empress of France (T.)	19	1913	Br.	Canadian Pacific	571·4	72·4	41·7
18,372	Mount Vernon	23½	1906	U.S.	U.S. Shipping Board	685·4	72·2	40·5
18,000	Marnix van St. Aldegonde (M.)	—	1929	Holl.	Nederland Stoom. Maats.	580·0	74·0	47·3
17,910	Republic	15	1907	U.S.	United States Lines	599·0	68·2	48·3
17,801	Kosmos	—	1929	Nor.	Kosmos A S.	554·1	77·2	49·6
17,759	De Grasse (T.)	16	1924	Fr.	C.G.T. (French Line)	552 ·	71·4	42·3
17,716	Gripsholm (M.)	17	1925	Swed.	Svenska-Amerika Line	553·0	74·4	37·7
17,498	Chichibu Maru (M.)	—	1930	Jap.	Nippon Yusen Kaisha	560·0	74·0	42·5
17,491	Aorangi (M.)	18½	1924	Br.	Union S.S. Co. of N.Z.	580·1	72·2	43·4
17,300	Reina del Pacifico (M.)	—	1930	Br.	Pacific Stm. Nav. Co.	551·0	76·3	38·5
17,281	Minnekahda (T. & R.)	16	1917	U.S.	Atlantic Transport Line	620·5	66·4	47·3
17,232	Malolo (T.)	22	1926	U.S.	Matson Nav. Co.	554·0	83·0	54·0
17,149	Nieuw Amsterdam	16	1906	Holl.	Holland-Amerika Line	600·3	68·9	35·6
17,048	Conte Rosso (T.)	19	1922	Ital.	Lloyd Sabaudo	570·2	74·2	35·9
17,046	Caledonia (T.)	15½	1925	Br.	Anchor Line	553·0	70·4	38·7
17,043	Felix Roussel (M.)	—	1929	Fr.	Messageries Maritimes	534·8	68·2	46·9
17,000	Dempo (M.)	—	1930	Holl.	Rotterdam Lloyd	550·0	70·0	44·0
16,991	Tuscania (T.)	15½	1922	Br.	Anchor Line	552·3	70·3	38·6
16,990	Georges Philippar (M.)	—	1930	Fr.	Messageries Maritimes	542·7	68·2	46·9
16,981	Baloeran (M.)	—	1929	Holl.	Rotterdam Lloyd	550·0	70·0	44·0
16,971	Cleveland	15½	1908	Ger.	Hamburg-Amerika Line	588·9	65·3	46·7
16,955	Tatsuta Maru (M.)	—	1929	Jap.	Nippon Yusen Kaisha	560·0	72·0	42·5
16,947	Asama Maru (M.)	19	1928	Jap.	Nippon Yusen Kaisha	560·0	72·0	42·5
16,923	Transylvania (T.)	15½	1925	Br.	Anchor Line	552·4	70·3	30·3
16,909	Empress of Asia (T.)	20	1913	Br.	Canadian Pacific	570·1	68·2	42·0
16,821	Arabic	17	1908	Br.	White Star Line	590·2	69·7	38·9
16,810	Empress of Russia (T.)	20	1913	Br.	Canadian Pacific	570·2	68·2	42·0
16,792	California (T.)	15½	1923	Br.	Anchor Line	553·0	70·4	38·8
16,737	Rangitata (M.)	15	1929	Br.	Federal Steam Nav. Co.	531·0	70·2	31·8
16,733	Rangitane (M.)	15	1929	Br.	New Zealand Shipping Co.	531·0	70·2	31·8
16,732	St. Louis (M.)	16	1928	Ger.	Hamburg-Amerika Line	543·8	72·4	42·1
16,699	Milwaukee (M.)	16	1929	Ger.	Hamburg-Amerika Line	546·6	72·4	42·2
16,698	Rangitiki (M.)	15	1929	Br.	New Zealand Shipping Co.	531·0	70·2	38·1
16,650	Ranchi	17	1925	Br.	P. & O.	548·5	71·3	43·2
16,644	Rajputana	17	1926	Br.	P. & O.	547·7	71·3	43·4
16,619	Rawalpindi	17	1925	Br.	P. & O.	547·7	71·3	43·4
16,601	Ranpura	17	1925	Br.	P. & O.	548·3	71·3	43·2
16,596	Mongolia (T.)	16	1923	Br.	P. & O.	551·6	72·0	38·5
16,572	Narkunda	17	1920	Br.	P. & O.	581·4	69·4	27·7
16,556	Moldavia (T.)	16	1922	Br.	P. & O.	552·4	71·7	38·4
16,500	Westernland (T. & R.)	16	1918	Br.	F. Leyland & Co.	575·3	67·8	41·2
16,484	Doric (T.)	16	1923	Br.	White Star Line	575·5	67·9	41·2
16,436	C. O. Stillman (M.)	—	1928	Br.	International Petroleum Co.	565·7	75·6	44·5
16,418	Montcalm (T.)	17	1921	Br.	Canadian Pacific	549·5	70·2	40·2
16,402	Montrose (T.)	17	1922	Br.	Canadian Pacific	548·7	70·2	40·3
16,322	Pennland (T. & R.)	16	1922	Br.	F. Leyland & Co.	575·4	67·8	41·2
16,314	Montclare (T.)	17	1922	Br.	Canadian Pacific	549·5	70·2	40·2
16,297	Cameronia (T.)	15½	1920	Br.	Anchor Line	552·4	70·4	38·8
16,243	Lancastria (T.)	16½	1922	Br.	Cunard Line	552·8	70·4	38·8
16,088	Naldera	17	1918	Br.	P. & O.	580·9	67·2	44·4
16,063	Calgaric (T. & R.)	14½	1918	Br.	White Star Line	550·3	67·3	43·0
15,637	Christiaan Huygens (M.)	17	1927	Holl.	Nederland Stoom. Maats.	551·5	68·8	36·2
15,575	President Fillmore	16	1904	U.S.	Dollar S.S. Lines	600·0	65·3	31·1
15,551	Almanzora (T. & R.)	17	1914	Br.	Royal Mail	570·0	67·3	33·3
15,543	President Johnson	16	1904	U.S.	Dollar S.S. Lines	600·0	65·3	31·1
15,507	Orduña (T. & R.)	14½	1914	Br.	Pacific Stm. Nav. Co.	550·3	67·3	43·0
15,495	Orbita (T. & R.)	14½	1915	Br.	Pacific Stm. Nav. Co.	550·3	67·3	43·0
15,450	Veendam (T.)	15	1923	Holl.	Holland-Amerika Line	550·2	67·3	41·1
15,434	Volendam (T.)	15	1922	Holl.	Holland-Amerika Line	550·2	67·3	32·6
15,363	Massilia (T. & R.)	20	1920	Fr.	Cie. de Nav. Sud Atlantique	577·1	64·1	37·0
15,357	Svealand (M.)	—	1925	Swed.	Augf. Akt. Tirfing	561·3	72·2	44·1

† * See notes on p. 405.

LARGEST MERCHANT VESSELS OF THE WORLD—*continued.*

Gross tonnage.	Name.	Speed † (knots.)	Date built.	Flag.	Owners.	L.* (ft.)	B.* (ft.)	D.* (ft.)
15,355	Amerikaland (M.)	—	1925	Swed.	Augf. Akt. Tirfing	561·3	72·2	44·1
15,286	Berlin	16½	1925	Ger.	Norddeutscher Lloyd	549·3	69·2	34·8
15,279	Comorin	16½	1925	Br.	P. & O.	523·5	70·2	42·3
15,276	Athos II (T.)	14	1925	Fr.	Messageries Maritimes	543·9	66·2	41·7
15,248	Chitral	16	1925	Br.	P. & O.	526·3	70·3	42·3
15,186	Minnedosa (T. & R.)	16½	1918	Br.	Canadian Pacific	520·0	67·2	41·8
15,183	Melita (T. & R.)	16½	1918	Br.	Canadian Pacific	520·0	67·2	50·3
15,135	Atlantis (T. & R.)	17	1913	Br.	Royal Mail	570·3	67·3	33·3
15,121	Cathay	16	1925	Br.	P. & O.	523·5	70·2	42·3
15,105	D'Artagnan	14	1924	Fr.	Messageries Maritimes	543·5	65·0	41·4
14,982	Ormonde (T.)	18	1917	Br.	Orient Line	580·5	66·7	40·5
14,947	Euripides (T. & R.)	15	1914	Br.	Aberdeen Line	550·7	67·4	44·1
14,930	Arlanza (T. & R.)	17	1912	Br.	Royal Mail	570·3	65·3	33·3
14,878	Megantic	17	1909	Br.	White Star Line	550·4	67·3	41·2
14,825	Chenonceaux (T.)	13	1922	Fr.	Messageries Maritimes	543·4	65·1	41·1
14,783	Lutetia (T. & R.)	20	1913	Fr.	Cie. de Nav. Sud Atlantique	579·0	64·1	36·7
14,694	Arandora Star (T.)	16	1927	Br.	Blue Star Line	512·2	68·3	34·0
14,690	Dresden	15½	1914	Ger.	Norddeutscher Lloyd	550·0	67·3	35·1
14,652	Ulysses	14	1913	Br.	Blue Funnel Line	563·2	68·4	40·2
14,642	Pieter Corneliszoon Hooft (M.)	16	1925	Holl.	Nederland Stoom. Maats.	541·3	67·8	46·5
14,629	Nestor	14	1913	Br.	Blue Funnel Line	563·2	68·4	31·2
14,457	Taiyo Maru	16	1911	Jap.	Nippon Yusen Kaisha	560·0	65·3	31·2
14 362	Sir James Clark Ross (M)	—	1930	Nor.	Hvalfanger A/S Rosshavet	537·9	74·3	34·4
14,305	Charles G. Black	—	1921	U.S.	Standard Oil Co.	550·3	72·2	43·7
14,198	Hobson's Bay (T.)	16	1922	Br.	Aberdeen-Commonwealth	530·6	68·3	39·9
14,187	President Lincoln (T.)	18	1921	U.S.	Dollar S.S. Lines	516·5	72·2	27·8
14,187	President Madison (T.)	18	1921	U.S.	Admiral Oriental Line	516·5	72·2	27·8
14,184	Largs Bay (T.)	16	1921	Br.	Aberdeen-Commonwealth	530·9	68·3	39·9
14,176	Esperance Bay (T.)	16	1922	Br.	Aberdeen-Commonwealth	530·9	68·3	39·9
14,174	President Jefferson (T.)	18	1920	U.S.	Admiral Oriental Line	516·5	72·2	27·8
14,164	Jervis Bay (T.)	16	1922	Br.	Aberdeen-Commonwealth	530·6	68·3	39·9
14,145	Moreton Bay (T.)	16	1921	Br.	Aberdeen-Commonwealth	530·6	68·3	39·9
14,137	Highland Monarch (M.)	15	1928	Br.	Nelson Line	523·4	69·4	37·1
14,131	Highland Chieftain (M.)	15	1929	Br.	Nelson Line	523·4	69·4	37·1
14,131	Highland Brigade (M.)	15	1929	Br.	Nelson Line	523·4	69·4	37·1
14,128	Highland Princess (M.)	15	1928	Br.	Nelson Line	523·4	69·4	37·1
14,127	President McKinley (T.)	18	1921	U.S.	Admiral Oriental Line	516·5	72·2	27·8
14,127	President Wilson (T.)	18	1921	U.S.	Dollar S.S. Lines	516·5	72·2	27·8
14,124	President Jackson (T.)	18	1921	U.S.	Admiral Oriental Line	517·0	72·2	27·8
14,123	President Cleveland (T.)	18	1921	U.S.	Dollar S.S. Lines	517·0	72·2	36·8
14,123	President Pierce (T.)	18	1921	U.S.	Dollar S.S. Lines	517·0	72·2	27·8
14,123	President Taft (T.)	18	1921	U.S.	Dollar S.S. Lines	517·0	72·2	27·8
14,119	President Grant (T.)	18	1921	U.S.	Admiral Oriental Line	517·0	72·2	27·8
14,075	Oropesa (T.)	14	1920	Br.	Pacific Stm. Nav. Co.	530·0	66·3	41·2
14,054	John D. Archbold	—	1921	U.S.	Standard Oil Co.	570·2	75·1	42·6
14,054	William Rockefeller	—	1921	U.S.	Standard Oil Co.	554·9	75·3	43·0
14,030	Alaunia (T.)	15	1925	Br.	Cunard Line	519·6	65·2	39·2
14,013	Ascania (T.)	15	1925	Br.	Cunard Line	520·0	65·3	39·0
13,984	Aurania (T.)	15	1924	Br.	Cunard Line	519·7	65·3	39·2
13,950	Andania (T.)	15	1922	Br.	Cunard Line	520·2	65·3	39·2
13,912	Ausonia (T.)	15	1921	Br.	Cunard Line	520·0	65·3	39·1
13,869	President Harding (T.)	19	1921	U.S.	United States Lines	516·5	72·2	27·8
13,869	President Roosevelt (T.)	20	1922	U.S.	United States Lines	516·5	72·2	27·8
13,868	Gelria	16½	1913	Holl.	Holland Lloyd	541·1	65·8	35·3
13,867	Antonia (T.)	15	1921	Br.	Cunard Line	519·9	65·3	39·1
13,801	New Sevilla	13	1900	Br.	Sevilla Whaling Co.	550·2	63·3	39·9
13,800	Monte Fascoal (M.)	—	1930	Ger.	Hamburg Sud-Amerika Line.	500·6	65·8	37·9
13,789	Southern Cross (T.)	18½	1920	U.S.	Munson S.S. Line	516·5	72·2	27·8
13,750	Monte Olivia (M.)	14½	1924	Ger.	Hamburg Sud-Amerika Line.	500·6	65·8	37·9
13,736	American Legion (T.)	18½	1920	U.S.	Munson S.S. Line	516·5	72·2	27·8
13,712	Pan America (T.)	18½	1921	U.S.	Munson S.S. Line	517·0	72·2	27·8
13,712	Western World (T.)	18½	1921	U.S.	Munson S.S. Line	517·0	72·2	41·0
13,682	André Lebon	14	1913	Fr.	Messageries Maritimes	508·2	61·6	45·8
13,640	Tafelberg	—	1930	Br.	Kerguelen Sealing & Whaling Co.	508·3	72·5	35·7
13,625	Monte Sarmiento (M.)	14½	1924	Ger.	Hamburg Sud-Amerika Line.	500·6	65·8	37·9
13,615	Cap Norte (T. & R.)	15	1922	Ger.	Hamburg Sud-Amerika Line.	499·5	64·0	38·7
13,589	Antonio Delfino (T. & R.)	15	1921	Ger.	Hamburg Sud-Amerika Line.	499·5	64·0	38·7
13,483	München	16	1922	Ger.	Norddeutscher Lloyd	526·9	65·0	34·7
13,475	Letitia (T.)	15½	1925	Br.	Anchor-Donaldson	525·7	66·4	29·5
13,465	Athenia (T.)	15½	1923	Br.	Anchor-Donaldson	526·3	66·4	38·1
13,415	Niagara (T. & R.)	18	1913	Br.	Union S.S. Co. of N.Z.	524·7	66·3	34·5
13,401	Tenyo Maru (T.)	16	1908	Jap.	Nippon Yusen Kaisha	558·0	61·9	35·5
13,387	Stuttgart	16	1923	Ger.	Norddeutscher Lloyd	527·0	65·0	34·7
13,361	Balmoral Castle	17	1910	Br.	Union Castle Line	570·0	64·5	38·9
13,330	Edinburgh Castle	17	1910	Br.	Union Castle Line.	570·2	64·7	38·7
13,248	Voltaire	14½	1923	Br.	Lamport & Holt	510·6	64·3	39·3
13,247	Juvenal	—	1928	Arg.	Cia. Gen. de Combustibles	556·0	74·1	40·3
13,246	C. A. Larsen	—	1913	Nor.	Hvalfanger A/S. Rosshavet	527·2	66·6	33·9
13,233	Vandyck (T.)	14½	1921	Br.	Lamport & Holt	510·6	64·3	39·3

† * See notes on p. 405.

LARGEST MERCHANT VESSELS OF THE WORLD—*continued.*

Gross tonnage.	Name.	Speed † (knots).	Date built.	Flag.	Owners.	L.* (ft.)	B.* (ft.)	D.* (ft.)
13,156	**Stavangerfjord**	16½	1918	Nor.	Norske-Amerika Line	532·5	64·2	29·3
13,154	Chilore (T.)	—	1922	U.S.	Ore S.S. Corp.	549·6	72·2	40·5
13,072	Baradine (T. & R.)	15½	1921	Br.	P. & O.	519·9	64·4	37·8
13,062	Barrabool (T. & R.)	15½	1922	Br.	P. & O.	519·9	64·4	37·8
13,056	San Fernando (T.)	—	1919	Br.	Eagle Oil Transport Co.	530·4	69·4	42·2
13,037	San Felix (T.)	11	1921	Br.	Eagle Oil Transport Co.	530·4	69·4	42·2
13,031	San Fabian (T.)	11	1922	Br.	Eagle Oil Transport Co.	530·5	69·4	42·0
13,026	Shinyo Maru (T.)	16	1911	Jap.	Nippon Yusen Kaisha	558·0	61·9	35·5
12,996	Ballarat (T. & R.)	15½	1921	Br.	P. & O.	519·8	64·2	37·8
12,995	Ausonia (T.)	21	1928	Ital.	Soc. Ital. di Servizi Marittimi	517·3	66·4	39·2
12,990	Balranald (T. & R.)	15½	1922	Br.	P. & O.	519·8	64·2	29·8
12,975	Kenilworth Castle	17	1904	Br.	Union Castle Line	570·2	64·7	38·7
12,973	Armadale Castle	17	1903	Br.	Union Castle Line	570·1	64·5	39·0
12,972	Bendigo (T. & R.)	15½	1922	Br.	P. & O.	519·8	64·2	37·8
12,915	San Gerardo (T.)	11	1922	Br.	Eagle Oil Transport Co.	530·2	68·5	42·1
12,910	San Gaspar (T.)	11	1921	Br.	Eagle Oil Transport Co.	530·2	68·5	42·1
12,872	Avila Star (T.)	16	1927	Br.	Blue Star Line	510·2	68·2	33·0
12,858	Avelona Star (T.)	16	1927	Br.	Blue Star Line	510·2	68·2	33·9
12,848	Almeda Star (T.)	16	1926	Br.	Blue Star Line	512·2	68·3	34·0
12,846	Andalucia Star (T.)	16	1927	Br.	Blue Star Line	512·2	68·3	34·0
12,842	San Florentino (T.)	—	1919	Br.	Eagle Oil Transport Co.	530·4	68·6	42·0
12,768	California (T.)	14	1920	Br.	Nav. Libera Triestina	523·1	64·0	43·9
12,692	Porthos	13½	1914	Fr.	Messageries Maritimes	510·8	61·6	42·1
12,678	Rochambeau (T. & R.)	15	1911	Fr.	C.G.T. (French Line)	559·4	63·7	43·3
12,642	City of Los Angeles (T.)	16	1899	U.S.	Los Angeles S.S. Co.	560·6	62·3	35·9
12,639	Vikingen	—	1929	Br.	Viking Whaling Co.	493·0	71·1	34·2
12,546	Walmer Castle	17	1902	Br.	Union Castle Line	570·5	64·4	38·6
12,510	Gulfpride (M.)	—	1927	U.S.	Gulf Refining Co.	525·0	74·3	31·6
12,420	Metagama	16	1915	Br.	Canadian Pacific	500·4	64·2	37·9
12,385	Saxon	17	1900	Br.	Union Castle Line	570·5	64·4	38·6
12,367	Corinthic	13	1902	Br.	White Star Line	500·3	63·3	45·0
12,358	Skytteren	13	1901	Nor.	A/S. Skytteren	550·2	63·3	39·9
12,354	Tamaroa (T.)	15	1922	Br.	Aberdeen Line	500·4	63·2	39·6
12,352	Ionic	13	1902	Br.	White Star Line	500·3	63·3	45·0
12,333	Mataroa (T.)	15	1922	Br.	Aberdeen Line	500·4	63·2	39·6
12,326	Sultan Star (T.)	16	1930	Br.	Blue Star Line	486·1	70·2	36·6
12,286	San Melito	—	1914	Br.	Eagle Oil Transport Co.	530·0	66·5	33·5
12,279	Solglimt	15½	1900	Nor.	Hvalfangerselsk. Atlas A/S.	547·1	62·1	34·6
12,272	Gange	18	1912	Ital.	Lloyd Triestino	477·5	60·2	43·2
12,263	Champollion	15	1924	Fr.	Messageries Maritimes	495·1	62·7	40·5
12,257	Oroya (T.)	14	1923	Br.	Pacific Steam Nav. Co.	525·3	62·8	32·1
12,239	Mariette Pacha	15	1925	Fr.	Messageries Maritimes	508·5	62·6	43·6
12,231	Thorshammer	11	1914	Nor.	Bryde & Dahls Hvalf. A/S.	525·5	66·5	41·4
12,222	Hektoria	13	1899	Nor.	A/S. Hektor	550·2	63·3	39·9
12,220	Mexique (T. & R.)	16	1915	Fr.	C.G.T. (French Line)	546·7	64·0	34·8
12,196	Ole Wegger	11	1914	Nor.	A/S. Ornen	527·5	66·6	42·0
12,153	Southern Empress	11	1914	Br.	Southn. Whaling & Sealing Co.	525·5	66·5	33·9
12,133	Orvieto	18	1909	Br.	Orient Line	535·3	64·0	38·6
12,112	Rotorua	15	1911	Br.	Federal Stm. Nav. Co.	526·4	61·4	33·3
12,092	Southern Princess	—	1915	Br.	Southn. Whaling & Sealing Co.	530·0	66·6	33·5
12,074	Cadillac	10½	1917	Br.	Anglo-American Oil Co.	530·2	66·3	33·8
12,070	Saranac	10½	1918	Br.	Anglo-American Oil Co.	530·5	66·3	42·7
12,067	Pelagos	13	1901	Nor.	Hvalfangerselsk. Pelagos A/S.	500·3	63·3	45·0
12,041	Orsova	18	1909	Br.	Orient Line	536·2	63·3	34·3
12,040	Sibajak (M.)	16½	1927	Holl.	Rotterdam Lloyd	506·6	62·7	35·2
12,015	Arcadian	16½	1908	Br.	Royal Mail	520·3	62·3	31·8
12,003	Colombo	16	1917	Ital.	Nav. Gen. Itallana	518·0	64·0	24·2
11,999	Athelcrown (M.)	—	1929	Br.	United Molasses Co.	526·5	68·8	38·9
11,996	Providence	15	1915	Fr.	Cie. Fr. de N. (Cyp. Fabre)	511·8	59·7	43·5
11,951	Llangibby Castle (M.)	16½	1929	Br.	Union Castle Line	486·0	66·2	27·8
11,941	Calgorolite (M.)	—	1928	Br.	Imperial Oil	522·0	70·3	38·7
11,940	F. H. Bedford, Jr. (M.)	—	1930	Danzig	Baltisch-Amer. Petrol. Import	521·5	70·4	38·7
11,930	Terukuni Maru (M.)	—	1930	Jap.	Nippon Yusen Kaisha	507·0	64·0	37·0
11,916	Argyllshire	14	1911	Br.	Federal Stm. Nav. Co.	526·2	61·4	33·3
11,900	Peter Hurll (M.)	—	1930	Danzig	Baltisch-Amer. Petrol. Import	520·0	—	—
11,885	Patria	15	1913	Fr.	Cie. Fr. de N. (Cyp. Fabre)	487·2	59·2	40·1
11,870	Yasukuni Maru (M.)	—	1930	Jap.	Nippon Yusen Kaisha	505·0	64·0	37·0
11,850	Frederick VIII.	17	1913	Den.	Forenede Damps. S.	523·5	62·3	38·3
11,810	Korea Maru	16	1901	Jap.	Nippon Yusen Kaisha	551·7	63·2	40·8
11,790	Siberia Maru	16	1901	Jap.	Nippon Yusen Kaisha	551·7	63·2	21·8
11,753	W. S. Farish (T.)	—	1930	U.S.	Standard Shipping Co.	525·0	74·3	40·5
11,718	Virgilio (M.)	15	1927	Ital.	Nav. Gen. Italiana	482·2	61·9	33·4
11,669	Orazio (M.)	15	1927	Ital.	Nav. Gen. Italiana	482·2	61·9	33·4
11,637	Cabo San Antonio (M.)	—	1930	Sp.	Ybarra & Co.	482·5	63·4	33·4
11,628	Australia (M.)	—	1928	U.S.	Texas S.S. Co.	509·7	60·2	39·9
11,622	Hikawa Maru (M.)	—	1930	Jap.	Nippon Yusen Kaisha	510·0	66·0	41·0
11,590	General Osorio (M.)	15	1928	Ger.	Hamburg-Amerika Line	498·5	66·0	32·8
11,580	Orcoma	14½	1908	Br.	Pacific Stm. Nav. Co.	511·6	62·2	29·1
11,555	Northumberland (T.)	15	1915	Br.	Federal Stm. Nav. Co.	530·5	63·0	31·9
11,520	Morro Castle (T.E.)	—	1930	U.S.	Atlantic, Gulf & W. Indies Line	508·0	70·9	39·0

† * See notes on p. 405.

LARGEST MERCHANT VESSELS OF THE WORLD—*continued.*

Gross tonnage.	Name.	Speed † (knots).	Date built.	Flag.	Owners.	L.* (ft.)	B.* (ft.)	D.* (ft.)
11,518	Kaisar-i-Hind	17	1914	Br.	P. & O.	520·0	61·2	33·1
11,500	Heinrich v. Reidemann (M.)	—	1930	Danzig	Baltisch-Amer. Petrol. Import	519·9	70·0	38·9
11,484	Darro	13½	1912	Br.	Royal Mail	500·7	62·3	40·2
11,484	Demerara	13½	1912	Br.	Royal Mail	500·7	62·3	40·2
11,483	Desna	13½	1912	Br.	Royal Mail	500·7	62·3	40·2
11,477	Deseado	13½	1912	Br.	Royal Mail	500·7	62·3	40·2
11,469	Sierra Cordoba	14½	1923	Ger.	Norddeutscher Lloyd	490·5	61·8	34·3
11,449	Tuscan Star (M.)	—	1930	Br.	Blue Star Line	471·0	68·3	35·1
11,439	Transbalt	12	1899	Russ.	Soviet Mercantile Fleet	501·1	62·2	46·3
11,431	Philoctetes (T.)	14	1922	Br.	Blue Funnel Line	511·9	63·2	41·1
11,430	Sierra Morena	14½	1924	Ger.	Norddeutscher Lloyd	490·5	61·8	34·3
11,410	Victolite (M.)	—	1928	Br.	Imperial Oil	510·2	68·2	38·0
11,406	Slamat (T.)	15	1923	Holl.	Rotterdam Lloyd	482·5	62·0	35·0
11,405	Esperia (T.)	21	1918	Ital.	Soc. Ital. di Servizi Marittimi	492·1	61·7	34·1
11,404	Vancolite (M.)	—	1928	Br.	Imperial Oil	510·2	68·2	38·0
11,404	Achilles (T.)	14	1920	Br.	Blue Funnel Line	507·4	63·2	41·1
11,302	Sierra Ventana	14½	1923	Ger.	Norddeutscher Lloyd	490·5	61·8	34·3
11,383	Remuera	14	1911	Br.	New Zealand Shipping Co.	485·0	62·3	41·0
11,375	Sphinx	14	1914	Fr.	Messageries Maritimes	478·0	60·7	40·6
11,347	Tyndareus	14	1916	Br.	Blue Funnel Line	507·0	63·2	41·6
11,337	Cuba (T.)	15½	1923	Fr.	C.G.T. (French Line)	476·0	62·3	35·1
11,330	J. A. Mowinckel (M.)	—	1930	Danzig	Baltisch-Amer. Petrol. Import	520·0	70·0	38·7
11,321	Sarpedon (T.)	15	1923	Br.	Blue Funnel Line	499·0	62·3	34·9
11,314	Patroclus (T.)	15	1923	Br.	Blue Funnel Line	498·8	62·3	26·4
11,309	Montrolite (M.)	—	1926	Br.	Imperial Oil	510·9	68·2	37·9
11,309	Canadolite (M.)	—	1926	Br.	Imperial Oil	510·0	68·0	38·0
11,300	Harry G. Siedel (M.)	—	1930	Danzig	Baltisch-Amer. Petrol. Import	513·3	68·1	39·5
11,300	Oriente (T.E.)	—	1930	U.S.	Atlantic Gulf & W. Indies Lines	508·0	70·9	39·0
11,293	Llanstephan Castle	14	1914	Br.	Union Castle Line	500·5	63·3	37·2
11,254	General Artigas (T.)	13½	1923	Ger.	Hamburg-Amerika Line	473·6	60·7	41·9
11,251	General San Martin (T.)	13½	1922	Ger.	Hamburg-Amerika Line	473·6	60·7	41·9
11,246	California Standard (M.)	—	1929	U.S.	Standard Oil Co. of California	513·5	68·1	39·5
11,243	Hororata	14	1914	Br.	New Zealand Shipping Co.	511·1	64·2	32·0
11,231	Themistocles	15	1911	Br.	Aberdeen Line	500·6	62·3	39·4
11,223	Demosthenes (T. & R.)	15	1911	Br.	Aberdeen Line	500·6	62·3	39·4
11,198	Hector (T.)	15	1924	Br.	Blue Funnel Line	498·8	62·3	26·4
11,181	Benalla	14	1913	Br.	P. & O.	500·1	62·2	29·8
11,174	Antenor (T.)	15	1925	Br.	Blue Funnel Line	497·7	62·2	35·0
11,172	Leopoldville	14	1929	Belg.	Lloyd Royal Belge	478·8	62·2	35·0
11,155	Espagne	15½	1909	Fr.	C.G.T. (French Line)	537·8	60·8	39·0
11,140	Jan Pieterszoon Coen	15	1915	Holl.	Nederland Stoom. Maats.	503·5	60·6	35·8
11,120	Macedonia	16	1904	Br.	P. & O.	530·4	60·4	25·5
11,103	Edison	13	1896	Br.	National Stm. Nav. Co. of Greece	523·1	60·1	34·9
11,081	Achilles	—	1915	U.S.	Panama Canal	514·0	65·2	36·5
11,073	Avon	16½	1907	Br.	Royal Mail	520·3	62·3	31·8
11,056	Nieuw Holland (T.)	15	1927	Holl.	Koninkl. Paketv. Maats.	540·5	62·7	32·3
11,055	Drottningholm (T.)	16½	1905	Swed.	Svenska-Amerika Line	517·0	60·0	38·0
11.015	Bergensfjord	16	1913	Nor.	Norske-Amerika Line	512·4	61·2	29·4
11,000	Heian Maru (M.)	—	1930	Jap.	Nippon Yusen Kaisha	510·0	66·0	41·0
11,000	Hiye Maru (M).	—	1930	Jap.	Nippon Yusen Kaisha	510·0	66·0	41·0
10,986	Malwa	16	1908	Br.	P. & O.	540·0	61·3	24·6
10,982	Campana (T.)	15	1929	Fr.	Soc. Gen. de Transport Mar. à Vap.	510·0	67·0	32·1
10,951	Huntingdon	14	1920	Br.	Federal Stm. Nav. Co.	520·7	64·2	38·1
10,946	Mantua	16	1909	Br.	P. & O.	540·0	61·3	24·6
10,946	Norfolk	14	1918	Br.	Federal Stm. Nav. Co.	520·7	64·2	38·1
10,937	Cumberland	14	1919	Br.	Federal Stm. Nav. Co.	520·0	64·2	29·0
10,936	Fushimi Maru	14½	1914	Jap.	Nippon Yusen Kaisha	513·0	63·5	37·5
10,926	Eastern Prince (M.)	18	1929	Br.	Prince Line	496·2	64·8	35·4
10,926	Western Prince (M.)	18	1929	Br.	Prince Line	496·2	64·8	35·4
10,923	Hertford (T. & R)	14	1917	Br.	Federal Stm. Nav. Co.	520·7	64·2	38·1
10,917	Northern Prince (M.)	18	1929	Br.	Prince Line	496·2	64·9	25·9
10,917	Southern Prince (M.)	18	1929	Br.	Prince Line	496·2	64·9	25·9
10,906	Nieuw Zeeland (T.)	15	1928	Holl.	Koninkl. Paketv. Maats.	540·0	62·5	35·5
10,902	City of Paris (T.)	14½	1922	Br.	City Line	484·7	59·3	32·6
10,893	Chief Capilano	13	1920	Br.	Canadian-American Nav. Co.	523·5	65·7	37·5
10,870	Ruahine	14	1909	Br.	New Zealand Shipping Co.	480·6	60·3	32·1
10,857	Monowai	18	1925	Br.	Union S.S. Co. of N.Z.	500·4	63·2	34·0
10,850	Cambridge	14	1916	Br.	Federal Stm. Nav. Co.	524·5	65·7	37·3
10,836	Tjibesar (T.)	12	1922	Holl.	Java-China-Japan Line	500·1	63·7	39·2
10,833	Cristobal Colon (T.)	17	1922	Sp.	Cia. Trasatlantica	499·4	61·0	32·3
10,826	Karlsruhe	15½	1900	Ger.	Norddeutscher Lloyd.	523·5	60·2	34·7
10,804	Ulysses	—	1915	U.S.	American Tankers Corp.	514·0	65·2	36·5
10,800	Worcestershire (M.)	15½	1930	Br.	Bibby Line	483·6	64·3	32·0
10,786	Llandaff Castle	14½	1926	Br.	Union Castle Line	471·1	61·7	39·0
10,725	Andrea F. Luckenbach (T.)	13	1919	Holl.	Luckenbach S.S. Co.	496·0	68·2	37·2
10,680	City of Honolulu	16	1900	U.S.	Los Angeles S.S. Co.	523·5	60·1	34·7
10,678	Indrapoera (M.)	15½	1925	U.S.	Rotterdam Lloyd	479·5	60·2	35·1

† * See notes on p. 405.

LARGEST MERCHANT VESSELS OF THE WORLD—*continued.*

Gross tonnage.	Name.	Speed † (knots).	Date built.	Flag.	Owners.	L.* (ft.)	B.* (ft.)	D.* (ft.)
10,672	Suwa Maru	14½	1914	Jap.	Nippon Yusen Kaisha	516·0	62·6	34·9
10,662	Lewis Luckenbach (T.)	13	1919	U.S.	Luckenbach S.S. Co.	496·0	68·0	40·0
10,660	Vauban	13½	1912	Br.	Lamport & Holt	495·5	60·8	28·7
10,654	Staffordshire (M.)	15½	1928	Br.	Bibby Line	483·6	62·3	32·0
10,646	Stuart Star (T.)	15	1926	Br.	Blue Star Line	475·8	67·3	36·6
10,644	Afric Star (T.)	15	1926	Br.	Blue Star Line	475·8	67·3	36·6
10,609	Llandovery Castle	14½	1925	Br.	Union Castle Line	471·1	61·7	39·0
10,583	Napier Star (T.)	15	1927	Br.	Blue Star Line	476·0	67·3	36·6
10,583	Rodney Star (T.)	15	1927	Br.	Blue Star Line	476·9	67·3	36·6
10,560	Shropshire (M.)	15½	1926	Br.	Bibby Line	483·6	60·3	31·8
10,560	Cheshire (M.)	15½	1927	Br.	Bibby Line	483·6	60·3	31·8
10,551	Alfonso XIII. (T.)	17	1921	Sp.	Cia. Trasatlantica	480·0	61·0	32·3
10,537	Cornwall (T.)	14	1920	Br.	Federal Stm. Nav. Co.	495·1	63·1	40·3
10,533	President Hayes	14	1920	U.S.	Dollar S.S. Lines	502·1	62·2	28·3
10,533	President Monroe	14	1920	U.S.	Dollar S.S. Lines	502·1	62·2	28·3
10,533	President Van Buren	14	1920	U.S.	Dollar S.S. Lines	502·1	62·2	28·3
10,516	President Adams	14	1921	U.S.	Dollar S.S. Lines	502·1	62·2	28·3
10,504	President Harrison	14	1921	U.S.	Dollar S.S. Lines	502·1	62·2	28·3
10,502	Guadeloupe	13	1908	Fr.	C.G.T. (French Line)	508·4	57·8	39·5
10,500	President Polk	14	1921	U.S.	Dollar S.S. Lines	502·1	62·2	28·3
10,495	President Garfield	14	1921	U.S.	Dollar S.S. Lines	502·1	62·2	28·3
10,480	Lemoyne	—	1926	Br.	Canada S.S. Line	621·1	70·2	25·4
10,441	Doric Star (T.)	12	1921	Br.	Blue Star Line	499·8	64·0	37·0
10,421	Haruna Maru (T.)	15½	1922	Jap.	Nippon Yusen Kaisha	495·0	62·0	37·0
10,420	Hakone Maru (T.)	15½	1921	Jap.	Nippon Yusen Kaisha	495·0	62·0	37·0
10,413	Hakozaki Maru (T.)	15½	1922	Jap.	Nippon Yusen Kaisha	495·0	62·0	37·0
10,388	California	—	1921	U.S.	Texas S.S. Co.	500·0	68·2	29·3
10,388	Beacon	—	1921	U.S.	Standard Shipping Co.	500·0	68·2	29·3
10,388	Albertville	14	1928	Belg.	Lloyd Royal Belge	494·1	62·0	24·0
10,380	Hakusan Maru (T.)	15½	1923	Jap.	Nippon Yusen Kaisha	495·0	62·0	37·0
10,374	Diomed (T.)	14	1922	Br.	Blue Funnel Line	491·0	62·4	31·1
10,355	Johan de Witt	15	1920	Holl.	Nederland Stoom. Maats.	482·2	59·2	34·8
10,353	Wilhelm A. Reidemann (M.)	—	1914	Danzig	Baltisch-Amer. Petrol. Import	525·7	66·5	33·5
10,348	Infanta Isabel de Borbon (T. & R.)	17	1913	Sp.	Cia. Trasatlantica	481·9	61·3	32·7
10,305	Calchas (T.)	14	1921	Br.	Blue Funnel Line	490·8	62·4	39·6
10,286	Perseus (T.)	14	1923	Br.	Blue Funnel Line	490·5	62·3	39·6
10,283	Menelaus (T.)	14	1923	Br.	Blue Funnel Line	495·5	62·3	39·6
10,268	Explorateur Grandidier	13	1924	Fr.	Messageries Maritimes	455·8	60·7	41·1
10,229	Ixion	14	1912	Br.	Blue Funnel Line	506·0	60·3	39·5
10,227	Tamiahua	—	1921	U.S.	Southern Pacific S.S. Lines	500·0	71·2	31·2
10,224	Talthybius	14	1912	Br.	Blue Funnel Line	506·0	60·3	39·5
10,220	Delftdijk (M.)	15	1929	Holl.	Holland-Amerika Line	490·9	64·7	34·1
10,208	Gulfbird (M.)	—	1928	U.S.	Gulf Refining Co.	511·7	69·5	36·7
10,208	Gulfhawk (M.)	—	1928	U.S.	Gulf Refining Co.	511·7	69·5	36·7
10,208	Gulfwing (M.)	—	1928	U.S.	Gulf Refining Co.	511·7	69·5	36·7
10,196	Kraljica Marija	16½	1906	Jugosl.	Jugoslavenski Lloyd	515·2	61·3	30·5
10,193	Brazza (M.)	13½	1923	Fr.	Chargeurs Réunis	453·1	59·1	36·1
10,191	Gretafield	—	1928	Br.	Northern Petroleum Tank S.S. Co.	500·2	67·9	36·9
10,184	Yorkshire (T.)	15	1920	Br.	Bibby Line	482·4	58·3	40·4
10,171	Flandria (T.)	14½	1922	Holl.	Holland Lloyd	450·1	59·2	41·7
10,155	Damsterdijk (M.)	—	1930	Du.	Holland-Amerika Line	490·9	64·7	34·1
10,138	City of Nagpur	14	1922	Br.	City Line	469·9	59·3	40·0
10,137	Reina Victoria-Eugenia (T. & R.)	17	1913	Sp.	Cia. Trasatlantica	480·0	61·3	40·7
10,123	Kerguelen (T.)	13½	1922	Fr.	Chargeurs Réunis	484·2	59·3	35·0
10,123	Jamaique (T.)	13½	1922	Fr.	Chargeurs Réunis	484·2	59·3	27·2
10,110	Amerika (M.)	15	1930	Dan.	East Asiatic Co.	465·4	62·2	37·2
10,092	Commissaire Ramel	12	1920	Fr.	Messageries Maritimes	478·8	59·2	33·4
10,086	Bernardin de Saint Pierre	13	1925	Fr.	Messageries Maritimes	455·8	60·8	41·0
10,078	Arctic Queen	12	1909	Br.	Hellyer Bros.	486·0	59·3	27·4
10,058	Aeneas	14	1910	Br.	Blue Funnel Line	493·0	60·4	28·6
10,056	General Belgrano	12½	1913	Ger.	Akt. Ges. fur Seeschiffahrt	491·6	59·1	35·6
10,051	Koll (M.)	—	1930	Nor.	Odd Bergs Tankrederi	487·4	66·0	37·3
10,048	Ascanius	14	1910	Br.	Blue Funnel Line	493·0	60·4	28·6
10,042	Beaverford (T.)	15½	1928	Br.	Canadian Pacific	503·0	61·8	37·5
10,041	Beaverhill (T.)	15½	1928	Br.	Canadian Pacific	503·0	61·8	37·5
10,012	Oscar II.	15½	1901	Den.	Forenede Damps. S.	500·8	58·3	37·6
10,006	Tilawa	12	1924	Br.	British India S.N. Co.	451·0	59·3	36·8
10,002	Dunbar Castle (M.)	—	1930	Br.	Union Castle Line	471·2	61·2	29·6
10,000	Anchises	14	1911	Br.	Blue Funnel Line	493·0	60·4	28·6
10,000	Talma	12	1923	Br.	British India S. N. Co.	451·0	59·3	36·8
10,000	Achimota (M.)	—	1930	Br.	Elder Dempster	460·0	63·8	31·3

† * See notes on p. 405.

NUMBERS OF MERCHANT VESSELS OF VARIOUS SPEEDS.†

Speed.	1910.	1922.	1924.	1926.	1928.	1930.
25 knots and over	—	8	4	3	6	9
24 ,, to 25	—	9	7	6	3	2
23 ,, 24	—	5	8	9	9	11
22 ,, 23	—	17	16	15	16	16
21 ,, 22	—	20	9	14	22	31
20 ,, 21	105*	32	39	42	51	39
19 ,, 20	42	26	19	28	24	40
18½ knots	24	18	16	20	19	24
18 ,,	60	54	55	50	49	67
17½ ,,	48	36	34	22	19	20
17 ,,	83	88	120	120	122	103
16½ knots	45	44	53	51	46	43
16 ,,	126	131	132	162	170	181
15½ ,,	47	35	45	52	62	75
15 ,,	215	185	201	205	210	217
14½ ,,	85	81	102	100	106	129
14 ,,	276	289	319	327	350	335
13½ ,,	138	170	172	169	183	205
13 ,,	462	458	461	451	446	488
12½ ,,	206	153	195	211	215	220
12 ,,	732	790	853	918	882	865

* This figure includes all merchant steamers of 20 knots and over in existence in 1910.

† The speeds used in compiling these tables are as given by the owners.

FASTEST MERCHANT VESSELS OF THE WORLD.†

Speed (knots).	Name.	Gross Tonnage.	Date built.	Flag.	Owners.	L.* (ft.).	B.* (ft.).	D.* (ft.).
26 and over	Bremen	51,656	1929	German	Norddeutscher Lloyd	898·7	101·9	48·2
	Europa	49,746	1928	,,	,,	890·2	102·1	48·0
25 and under 26	Majestic	56,621	1921	British	White Star Line	915·5	100·1	58·2
	Leviathan	59,957	1914	U.S.	United States Lines	907·6	100·3	58·2
	Mauretania	30,696	1907	British	Cunard Line	762·2	88·0	57·1
	Anglia	3,460	1920	,,	L.M.S. Railway Co.	380·5	45·2	17·2
	Hibernia	3,458	1920	,,	,,	380·6	45·2	17·2
	Cambria	3,445	1921	,,	,,	380·6	45·2	17·2
	Scotia	3,441	1921	,,	,,	380·5	45·2	17·2
24 and under 25	Versailles	1,903	1919	French	French State Railways (Southern Railway Co.)	300·6	36·1	21·4
	Paris	1,774	1913	British	Southern Railway Co.	293·5	35·6	15·2
23 and under 24	Ile de France	43,153	1926	French	Cie. Gen. Transatlantique	763·7	92·0	55·9
	Maid of Orleans	2,386	1918	British	Southern Railway Co.	341·1	42·1	16·0
	Biarritz	2,388	1915	,,	,,	341·2	42·1	24·0
	Newhaven	1,656	1911	French	French State Railways (Southern Railway Co.)	292·0	34·6	22·1
	Rouen	1,656	1912	,,		292·0	34·6	22·1
	Worthing	2,288	1928	British	Southern Railway	297·7	38·7	15·0
	Berengaria	52,226	1912	British	Cunard Line	883·6	98·3	57·1
	Aquitania	45,647	1914	,,	,,	868·7	97·0	49·7
	H. F. Alexander	8,357	1915	U.S.	Admiral Line	509·5	63·1	21·0
	Monticello	19,361	1902	,,	U.S. Shipping Board	684·3	72·3	40·2
	Mount Vernon	18,372	1906	,,	,,	685·4	72·2	40·5
22 and under 23	Viking	1,957	1905	British	Isle of Man Stm. Packet Co.	350·4	42·0	16·1
	Engadine	1,786	1911	,,	Southern Railway Co.	316·0	41·1	15·8
	Riviera	1,675	1911	,,	,,	316·0	41·1	15·8
	Olympic	46,439	1911	,,	White Star Line	852·5	92·5	59·5
	Prinses Juliana	2,908	1920	Dutch	Stoomvaart Maatschappij "Zeeland"	350·4	42·7	23·9
	Mecklenburg	2,907	1922	,,		350·4	42·7	23·9
	Oranje Nassau	2,885	1909	,,	,,	350·0	42·7	16·4
	Ben-my-Chree	2,586	1927	British	Isle of Man Stm. Packet Co.	355·0	46·1	17·4
	St. Andrew	2,495	1908	,,	Fishguard and Rosslare Rlwys. and Harbour Co.	351·1	41·1	16·5
	St. David	2,457	1906	,,		350·8	41·1	16·5
	Wahine	4,436	1913	,,	Union S.S. Co. of N.Z.	375·0	52·2	25·6
	Lady of Mann	3,104	1930	,,	Isle of Man Stm. Packet Co.	363·6	50·2	17·4
	Prince David	6,892	1930	,,	Canadian National Steamships	366·4	57·1	18·9
	Prince Henry	6,893	1930	,,		366·4	57·1	27·4
	Prince Robert	5,900	1930	,,		365·0	—	—
	Malolo	17,232	1927	U.S.	Matson Navigation Co.	554·0	83·2	30·7

* Registered dimensions; see note on p. 405.

† The speeds used in compiling this table are as given by the owners.

PARTICULARS OF FAST VOYAGES ON CERTAIN PASSENGER SERVICES.

Name of Vessel.	Owners.	Date of Voyage.	Ports between which Voyage was made.	Distance (Sea miles).	Time taken.	Average speed (Knots).	Best day's run (Knots).	Remarks.
Bremen . .	Norddeutscher Lloyd	July, 1929	Cherbourg to New York *	3,164	4d. 17h. 42m.	27·83	713	
,,	,, ,,	July, 1929	New York to Cherbourg *	3,084	4d. 14h. 30m.	27·91	667	
Europa . . .	,, ,,	March, 1930	Cherbourg to New York *	3,157	4d. 17h. 6m.	27·91	704	
,,	,, ,,	May, 1930	New York to Cherbourg *	3,200	4d. 20h. 48m.	27·40	654	
Mauretania . .	Cunard Line	Sept., 1910	Liverpool to New York §	2,780	4d. 10h. 41m.	26·06	—	
,,	,, ,,	Aug., 1924	New York to Cherbourg *	3,198	5d. 1h. 49m.	26·25	626	* Cherbourg Breakwater and Ambrose Channel Light Vessel.
,,	,, ,,	Aug., 1929	Cherbourg to New York *	3,162	4d. 21h. 44m.	26·85	687	
,,	,, ,,	Aug., 1929	New York to Plymouth †	3,098	4d. 17h. 50m.	27·22	636	† Ambrose Channel Light Vessel and Eddystone Lighthouse.
,,	,, ,,	Aug., 1929	Plymouth to Cherbourg *	106	—	29·7	—	
Majestic . .	White Star Line	Sept., 1923	New York to Cherbourg *	3,104	5d. 5h. 21m.	24·76	613	
Laurentic . .	,, ,,	June, 1930	Quebec to Liverpool ‡	2,444	5d. 21h. 15m.	17·30	—	‡ Father Point and Bar Light Vessel.
Empress of France	Canadian Pacific Steamships, Ltd.	July 17–24, 1924	Southampton to Quebec	2,640	5d. 8h. 51m.	20·49	—	§ Daunts Rock and Sandy Hook Lightship.
Duchess of York	,, ,,	Sept., 1930	Greenock to Quebec	2,558	5d. 8h. 34m.	19·9	—	
Empress of Japan	,, ,,	Aug., 1930	Yokohama to Vancouver	4,179	8d. 6h. 27m.	21·05	—	‖ Record sea transit to Bombay, but not record speed as vessel did not deviate to Marseilles.
China . . .	P. & O.	Sept. 26 to Oct. 14, 1919	London to Bombay	6,258	17d. 20h. ‖	15·7	—	
Orbita . . .	Pacific Steam Navigation Co.	May 5 to July 18, 1927	Liverpool, Valparaiso, Liverpool, *via* Panama Canal	18,443	73d. 18h. (actual steaming 55d. 3h.)	14·5	376	
Paris . . .	Southern Railway and French State Railway	July 14, 1913	Newhaven to Dieppe	65	2h. 35m. 37s.	25·07	—	
Maid of Orleans	Southern Railway	April, 1922	Dover to Calais	20	50m.	24·0	—	

NUMBERS OF MERCHANT VESSELS USING THE VARIOUS TYPES OF PROPULSION.*

(Excluding vessels of less than 100 tons gross.) As at June, 1930.

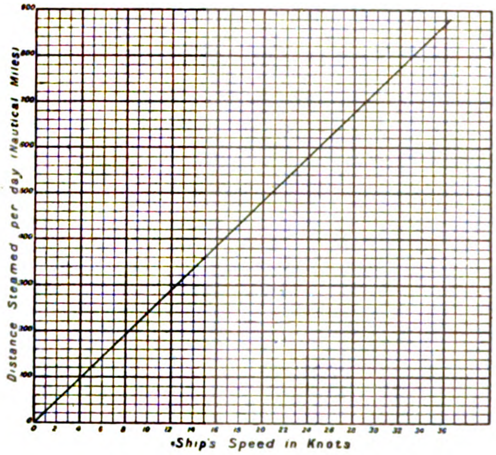
Country.	Oil Engines.	Steam Turbines.	Steam Recipro-cating Engines.	Auxiliary Steam Engines.	Auxiliary Oil Engines.	Sails.	Totals.
Great Britain and Ireland	453	324	7,004	1	74	382	8,238
British Dominions	167	25	1,815	3	95	411	2,516
British Empire	620	349	8,819	4	169	793	10,754
United States	258	596	1,968	1	34	673	3,530
Belgium	12	14	211	—	1	5	243
Denmark	89	16	478	2	58	62	705
France	46	69	1,350	1	35	150	1,651
Germany	183	63	1,651	5	236	19	2,157
Greece	2	—	533	—	11	—	546
Holland	272	62	932	—	115	20	1,401
Italy	112	54	875	3	61	275	1,380
Japan	157	46	1,667	68	122	—	2,060
Norway	292	10	1,528	17	58	11	1,916
Spain	47	11	683	3	51	96	891
Sweden	143	12	1,034	1	116	111	1,417
Other Countries	230	8	2,624	3	153	469	3,487
Total	2,463	1,310	24,353	108	1,220	2,684	32,138

* Excluding American Great Lakes vessels and Japanese sailing vessels.

COMPARISON OF RUNNING COSTS OF STEAM- AND MOTORSHIPS.

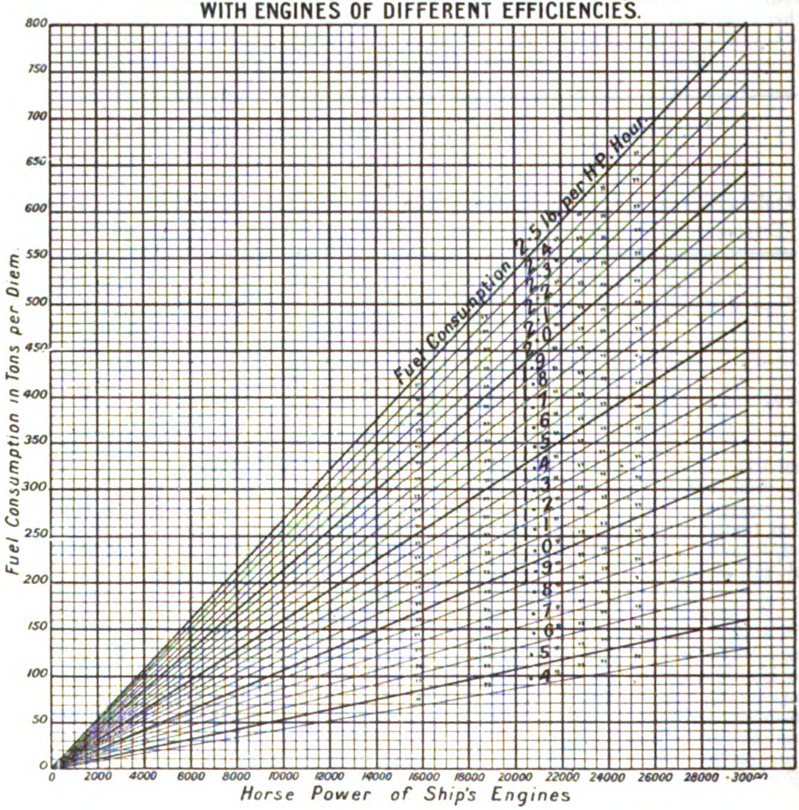
DEADWEIGHT CAPACITY, 8,000 TONS. SPEED, 10½ KNOTS. VOYAGE, 30 DAYS.

Type of Machinery	S.S. Diesel 2,200 B.H.P.	S.S. Geared Turbines. 2,200 S.H.P.	S.S. Recip. 2,500 I.H.P.	S.S. Recip. Bauer Wach 2,500 I.H.P.
Fuel	Oil.	Coal.	Coal.	Coal.
Fuel 163/h.p. hour	0·4	1·56	1·65	1·25
,, tons day	9·4	36·7	44·2	33½
,, voyage	282	1,101	1,326	1,005
Price, fuel/ton	£3 5*s*.	£1 5*s*.	£1 5*s*.	£1 5*s*.
Cost/voyage	£916 10*s*.	£1,376 5*s*.	£1,657 10*s*.	£1,256 5*s*.
Lub. oil, galls./day	14	6	4	6
,, cost/gall.	2*s*. 2*d*.	2*s*. 2*d*.	1*s*. 9*d*.	2*s*. 2*d*.
,, voyage	£45	£19 10*s*.	£10 10*s*.	£19 10*s*.
E.R. staff	8	21	21	21
Wages/voyage	£151	£228 10*s*.	£228 10*s*.	£228 10*s*.
Provision/voyage	£30	£78 15*s*.	£78 15*s*.	£78 15*s*.
Wages, fuel, lub. oil, and provisions/voyage	£1,132 10*s*.	£1,703	£1,975 5*s*.	£1,583
Running costs—Ratio	1	1·5	1·74	1·4
Comparative cost— Fuel winches/harbour	£28 10*s*. (electric)	£96 5*s*. (steam)	£96 5*s*. (steam)	£96 5*s*. (steam)



DISTANCE STEAMED IN ONE DAY BY SHIPS OF DIFFERENT SPEEDS.

DAILY FUEL CONSUMPTION OF STEAMERS & MOTOR SHIPS WITH ENGINES OF DIFFERENT EFFICIENCIES.



IMPORTANT DATES IN THE DEVELOPMENT OF MARINE PROPELLING MACHINERY.

—	Approximate Date of Introduction in the United Kingdom.			
	Merchant.		Naval.	
Compound engines	—	1860	—	1865
Triple-expansion engines	—	1880	—	1885
Quadruple-expansion engines	—	1890	Not fitted	—
Cylindrical boilers	—	1862	—	1869
Water-tube boilers	Cross-channel	1911	Destroyers	1893
	Ocean liners	1914	Battleships	1897
Direct turbines	Cross-channel	1901	Destroyers	1898
	Ocean liners	1905	Light cruisers	1904
			Battleships	1906
Combination engines and turbines	Intermediate liner	1908	(For cruising only)	1902
Combination machinery on common line shafting (Bauer-Wach system)	Intermediate liner and cargo steamers	1926	—	—
Geared turbines	Single-reduction	1911	Single-reduction	1913
	Double-reduction	1916	Not fitted	—
High pressure turbines	Single-reduction	1926	Destroyers	1926
Electric propulsion	First attempts	1904	Not fitted	—
	Diesel-electric	1913	—	—
	Turbo-electric (Large liner)	1929	—	—
Oil fuel burning	First attempts	1870	Coal and oil—	
			Destroyers	1902
			Battleships	1904
	Modern plant	1892	Oil alone—	
			Destroyers	1910
			Battleships	1913
Heavy oil engines	First attempts	1904	Tender	1914
	Modern plant	1910	Submarines	1908
	Double-acting	1924	Subm. depôt ship	1928
	Supercharging	1925	—	—
Pulverised Coal Firing	First attempts	1928	—	—

PROGRESS IN MARINE MACHINERY.

Type of vessel.	Year.	Dimensions.		Performance.		Engines.						Boilers.					Total weight of Machinery. "Steam Up" (tons).	H.P. per ton of Machinery.	Coal Consumption (lbs. per H.P. hour).
		Length (feet).	Beam (feet).	Speed (knots).	Horse-power.	No. of Propellers.	Type of Machinery.*	No. of Cylinders (per shaft).	Propeller revs. per min.	Piston speed (f.p.m.)	Referred M.P. (lb. per sq. in.)	No. and Type.†	Working press. (lb. per sq. in.)	System of Draught.‡	Heating Surface per H.P. (sq. ft.)	H.P. per sq. ft. of grate.			
Atlantic liners	1881	500	50	18·0	10,680	1	C	3	64	770	29·1	–C	100	N	3·3	8·57	1,860	5·74	—
	1888	528	63	20·1	18,500	2	TE	3	86	860	35·3	9 DC	150	CS	2·75	14·3	2,516	7·4	1·7
	1893	600	65	22·0	30,000	2	TE	5	81	930	35	12 DC	165	N	2·73	11·4	4,935	6·1	1·6
	1899	685	68	20·7	27,000	2	TE	4	78	936	35	15 DC	192	AD	2·77	13·75	4,414	6·1	—
	1907	760	87	26·0	72,500	4	T	—	180	—	—	23 DC & 2 C	195	H	2·19	17·9	9,936	7·3	1·4
	1914	865	96	23·5	60,000	4	T	—	180	—	—	21 DC	195	H	2·31	16·9	9,302	6·5	1·3
	1921	912	100	23·5	66,000	4	T	—	180	—	—	48 W	260	FD	3·33	16·4	—	—	—
Intermediate Ocean liners	1880	400	45	12·5	3,000*	1	C	2	61	671	20·5	2 C	90	N	3·1	7·6	685	4·35	2·4
	1892	470	53	12·5	3,500*	2	TE	3	80	640	32·0	2 DC & 1 C	170	N	3·3	10·0	795	4·4	1·9
	1911	520	64	14·5	7,500*	2	QE	4	82	738	37·0	5 DC	210	N	3·25	11·75	1,750	4·25	1·6
	1914	550	66	16·5	11,000§	2	GT	—	133	1,650P	—	5 DC	210	H	2·5	17·5	1,800	6·1	1·4
	1920	550	66	17·0	11,000§	2	GT	—	85	{3,200 2,000}Q	—	5 Wz	250	OD	2·25	—	1,210	9·1	0·9a
Cargo steamers	1877	314	35	11·25	775*	1	FC	—	52	450	23	1 OC	70	N	4·46	7·6	200	3·87	2·5
	1885	320	38	12·25	1,650*	1	TE	—	70	560	31·5	2 C	150	N	2·82	10·4	340	4·85	1·95
	1911	440	52	13·25	4,200*	1	TE	—	73	750	35	2 C	190	FD	2·8	16·25	900	4·67	1·65
	1914	450	56	14·25	5,000§	1	GT	—	102	1,350P	—	2 C	195	H	2·30	20·0	930	6·45	1·45
	1920	503	63	14·25	7,000§	2	DT	—	80	{3,500 1,800}Q	—	3 FCz	200	OD	2·25	—	1,100	6·35	0·85a
Cross-Channel Steamers	1890	300	35	18·00	4,400*	2	TE	3	130	780	30·75	5 C	160	N	2·6	12·25	590	7·45	2·25
	1898	315	37	19·75	5,520*	2	TE	4	165	910	43·0	4 C	180	FD	1·95	17·5	610	9·62	2·1
	1904	330	42	19·5	5,500§	3	T	—	550	550P	—	2DC&1C	150	FD	1·9	16·5	590	9·3	1·8
	1910	316	41	21·5	8,500§	3	T	—	625	625P	—	7 W	190	FD	1·95	15·0	735	11·6	1·7
	1920	302	36	23·5	12,300§	2	GT	—	435	{2,600 1,800}Q	—	8 W	195	FD	2·00	22·0	1,055	11·65	1·5
	1925	329	45	22·25	—	2	GT	—	270	—	—	5 W	200	FD	—	—	—	—	—
Motor ships	1909	210	38	8·5	490*	1	4 S	6	140	550	99y	Steam auxiliaries		—	—	—	91	4·3t	0·6a
	1910	260	43	10·5	1,460*	1	4 S	6	125	820	111y	,,	,,	—	—	—	220	5·0t	0·5a
	1912	380	53	11·0	2,500*	2	4 S	8	140	670	89·8y	Electric	,,	—	—	—	390	4·8t	0·47a
	1914	425	55	11·25	3,100*	2	4 S	6	125	785	89·5y	,,	,,	—	—	—	475	4·9t	0·45a
	1916	450	57	12·0	4,000*	2	4 S	6	100	725	91·0y	,,	,,	—	—	—	600	5·0t	0·45a
	1922	502	62	13·5	6,400*	2	4 S	8	115	865	91·5y	,,	,,	—	—	—	940	5·1t	0·45a
	1924	580	72	18·5	17,500*	4	2 S	6	135	880	93·0y	Steam	,,	—	—	—	2,350	—	0·48a
	1926	630	79	17·0	20,000	2	4 D	8	125	1,229	83·0y	Electric	,,	—	—	—	5,000	5·0	0·43a
	1927	711	82½	20·0	25,000	4	2 D	6	120	950	—	,,	,,	—	—	—	—	—	—

* C = Vertical Compound; F.C. = Tandem Compound with flywheel; TE = triple expansion; QE = quadruple expansion; T = turbines; GT = geared turbines; DT = double-reduction geared turbines; ED = electric drive; 4S = 4-cycle single acting motors; 4D = 4-cycle double-acting motors; 2S = 2-cycle single acting motors.

† C = cylindrical; OC = oval ends and cylindrical middle portion; DC = double-ended cylindrical; FC = oil-fired cylindrical; W = water-tube (oil-fired).

‡ N = natural draught; AD = assisted draught; CS = closed stokehold; FD = forced draught; H = Howden's forced draught; OD = oil-burning with forced draught.

* I.H.P. § S.H.P. t B.H.P. P turbine revs. per min. Q turbine revs. per min., H.P. and L.P. respectively.

z with superheaters. a Oil. y Mean Pressures for motorships are on I.H.P. basis.

NATIONALITY AND NET TONNAGE OF VESSELS WHICH ENTERED AND CLEARED WITH CARGOES IN THE FOREIGN TRADE OF THE UNITED KINGDOM FOR THE YEARS 1913, 1928 AND 1929.

(Thousands of Net Tons).

Nationalty.	Entrances.			Clearances.			Percentage Entrances.			Percentage Clearances.		
	1913.	1928.	1929.	1913.	1928.	1929.	1913.	1928.	1929.	1913.	1928.	1929.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.						
British	32,292	40,220	40,748	40,101	43,375	45,342	65·8	66·7	65·0	59·1	67·3	66·0
Foreign :—												
Norwegian	3,285	2,528	2,729	4,683	2,034	2,362	6·7	4·2	4·3	6·9	3·2	3·4
American	724	3,210	3,314	370	1,909	1,761	1·5	5·3	5·3	0·5	3·0	2·6
Swedish	1,891	1,581	1,849	3,016	1,398	1,771	3·9	2·6	3·1	4·5	2·2	2·6
Dutch	1,702	2,749	2,968	2,536	3,122	3,179	3·5	4·6	4·7	3·7	4·8	4·6
Danish	1,161	1,586	1,666	2,613	1,727	1,923	2·4	2·6	2·7	3·9	2·7	2·8
French	999	2,144	2,273	1,975	2,833	3,192	2·0	3·6	3·6	2·9	4·4	4·6
Belgian	1,369	1,278	1,317	957	1,141	1,222	2·8	2·1	2·1	1·4	1·8	1·8
Japanese	140	478	466	282	464	413	0·3	0·8	0·7	0·4	0·7	0·6
Spanish	1,060	706	793	1,694	1,247	1,207	2·2	1·2	1·3	2·5	1·9	1·8
Italian	122	340	403	955	834	1,255	0·2	0·6	0·6	1·4	1·3	1·8
Russian*	678	—*	—*	937	—*	—*	1·4	—*	—*	1·4	—*	—*
Greek	221	415	566	1,072	1,172	1,413	0·4	0·7	0·9	1·6	1·8	2·1
German	3,166	2,030	2,141	5,730	1,944	2,106	6·4	3·2	3·4	8·5	3·0	3·1
Austro-Hungarian*	128	—*	—*	715	—*	—*	0·3	—*	—*	1·0	—*	—*
Other Nationalities	125	1,072	1,470	185	1,246	1,539	0·2	1·8	2·3	0·3	1·9	2·2
Total Foreign	16,772	20,117	21,954	27,720	21,071	23,342	34·2	33·3	35·0	40·9	32·7	34·0
Total British and Foreign	49,064	60,337	62,701	67,821	64,449	68,684	100·0	100·0	100·0	100·0	100·0	100·0

* Included in Other Nationalities.

	Entrances and Clearances.			Percentages.		
	1913.	1928.	1929.	1913.	1928.	1929.
	Tons.	Tons.	Tons.			
British	72,393	83,598	86,090	62	67	66
Foreign	44,492	41,188	45,296	38	33	34
Total	116,885	124,786	131,386	100	100	100

ENTRANCES AND CLEARANCES IN THE FOREIGN TRADE OF THE UNDERMENTIONED COUNTRIES FOR THE YEARS 1913, 1928, AND 1929.

Note.—C=With Cargo only. C & B=With Cargo and in Ballast.

Countries.		Entrances.			Clearances.		
		1913.	1928.	1929.	1913.	1928.	1929.
		Thousand tons net.	Thousand tons net.	Thousand tons net.	Thousand tons net.	Thousand tons net.	Thousand tons net.
United Kingdom	C	49,068	60,336	62,692	67,824	64,452	68,696
United States of America	C & B	53,280	57,336†	59,476†	53,796	63,304†	65,043†
France	C	34,512	52,356	58,092	26,112	46,416	49,193
Japan	C & B	24,720	52,272	55,200	24,900	51,816	55,389
Netherlands	C	17,148	26,652	25,519	11,016	21,924	17,461
Spain*	C & B.	25,788	*	*	28,992	*	*
British India	C	6,700	8,112	8,222	8,256	8,328	8,824
Australia	C & B.	5,364	5,340	5,624	5,232	5,292	5,598
South Africa	C & B	5,352	5,208	5,234	5,280	5,196	5,245
Norway	C	3,756	3,936	4,225	4,740	4,836	6,407
Belgium	C	16,908	28,188	29,715	16,896	28,044	29,590
Sweden	C & B	13,764	11,892	13,213	17,004	13,332	15,500
Germany	C & B	26,580	35,712	35,369	26,640	27,756	28,218

ABOVE AS PERCENTAGES OF 1913 FIGURES.

United Kingdom	100	123	128	100	95	101
United States of America	100	108†	112†	100	118†	121†
France	100	151	168	100	178	188
Japan	100	211	223	100	208	222
Netherlands	100	155	149	100	199	159
Spain*	100	*	*	100	*	*
British India	100	121	123	100	101	107
Australia	100	100	105	100	101	107
South Africa	100	97	98	100	98	99
Norway	100	105	124	100	102	135
Belgium	100	167	176	100	166	175
Sweden	100	86	96	100	78	91
Germany	100	134	133	100	104	106

* Figures not available. † With cargo only.

NUMBER AND NET TONNAGE OF VESSELS THAT PASSED THROUGH THE SUEZ CANAL IN THE YEARS 1913, 1923, 1928, AND 1929, DISTINGUISHING THE PRINCIPAL NATIONALITIES.

Nationality of Vessels.	Number of Passages.				Net Tonnage of Vessels.				Numbers as Percentages of Total.				Tonnages as Percentages of Total.			
	1913.	1923.	1928.	1929.	1913.	1923.	1928.	1929.	1913.	1923.	1928.	1929.	1913.	1923.	1928.	1929.
British	2951	2839	3393	3517	12,052,484	14,264,214	18,124,074	19,114,282	58·0	61·5	55·8	56·0	60·2	62·8	56·8	57·1
Japanese . . .	68	172	158	163	343,732	986,283	940,070	951,510	1·3	3·7	2·6	2·6	1·7	4·4	2·9	2·8
Dutch	342	451	617	653	1,287,354	2,178,058	3,329,628	3.544,416	6·7	9·8	10·1	10·4	6·4	9·6	10·4	10·6
French . . .	256	259	359	399	927,787	1,294,400	1,926,969	2,165.511	5·0	5·6	5·9	6·4	4·6	5·7	6·0	6·5
Italian	110	256	363	319	290,576	1,042,754	1,649,792	1,524,890	2·2	5·6	6·0	5·1	1·5	4·6	5·2	4·5
Danish	56	64	71	84	171,848	299,695	353,928	403,603	1·1	1·4	1·2	1·3	0·9	1·3	1·1	1·2
Norwegian . . .	44	87	149	148	93,313	335,597	686,749	701,881	0·9	1·9	2·4	2·4	0·5	1·5	2·2	2·1
American (U.S.) .	8	114	123	118	7,476	614,128	729,353	705,155	0·2	2·5	2·0	1·9	—	2·7	2·3	2·1
Swedish . . .	33	60	66	76	122.957	275,264	307,316	367,767	0·7	1·3	1·1	1·2	0·6	1·2	1·0	1·1
Greek	17	20	90	68	54,560	61,031	280,033	187,492	0·3	0·4	1·5	1·1	0·3	0·3	0·9	0·6
Spanish . . .	26	13	6	6	75,643	36,718	17,801	17,809	0·5	0·3	0·1	0·1	0·4	0·2	0·1	0·1
German . . .	778	247	611	620	3,352,287	1,213,691	3,300,018	3,455,402	15·3	5·4	10·0	9·9	16·7	5·4	10·3	10·3
Austria-Hungarian	246	—	—	—	845,830	—	—	—	4·8	—	—	—	4·2	—	—	—
Russian	110	23	20	33	340,595	73,896	67,821	104,044	2·2	0·5	0·3	0·5	1·7	0·3	0·2	0·3
All others . . .	40	16	58	70	67,422	54,433	192,350	222.261	0·8	0·1	1·0	1·1	0·3	0·0	0·6	0·7
Total . .	5085	4621	6084	6274	20,033,802	22,730,162	31,905,902	33,466,014	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0

NOTE.—The above figures include not only Merchant Vessels and Mail Steamers, but also Warships and Transports as well as Government Chartered Vessels.

NUMBER AND NET TONNAGE OF COMMERCIAL VESSELS THAT PASSED THROUGH THE PANAMA CANAL IN THE YEARS ENDED 30TH JUNE, 1920, 1921, 1922, 1924, 1926, 1928, 1929, AND 1930, DISTINGUISHING THE PRINCIPAL NATIONALITIES.

NOTE.—Commercial Vessels include all Vessels except those of the United States Government, or chartered by the U.S. Government to carry Government supplies, and Vessels of less than 10 tons measurement.

Nationality.	Number of Vessels.								Net Tonnage of Vessels.							
	1920.	1921.	1922.	1924.	1926.	1928.	1929.	1930.	1920.	1921.	1922.	1924.	1926.	1928.	1929.	1930.
British	753	972	935	1,265	1,423	1,842	1,783	1,536	2,760,188	3,978,329	3,795,526	6,097,611	7,039,542	8,976,960	8,994,526	8,006,962
American (U.S.A.)*	1,129	1,210	1,095	2,947	2,432	2,753	2,700	2,885	3,791,088	4,861,761	4,971,509	15,806,899	12,565,255	13,752,957	13,325,753	14,534,495
German † . . .	—	—	—	—	—	—	—	377	—	—	—	—	—	—	—	1,433,074
Norwegian . . .	106	140	113	136	306	313	340	371	397,632	548,227	385,007	546,633	987,040	1,181,189	1,280,184	1,660,101
Japanese	118	136	189	171	131	188	155	163	515,243	613,245	872,466	815,468	946,028	909,232	775,005	803,182
Chilian	79	63	53	47	26	32	31	46	212,000	159,727	150,398	176,472	121,901	124,959	130,599	164,152
Danish	9	60	53	65	63	69	101	91	32,221	236,512	227,473	245,929	234,753	285,396	416,985	381,766
Peruvian	75	60	60	70	64	53	48	2	191,689	157,495	161,930	189,046	149,162	140,323	109,100	8,959
Dutch	29	50	66	102	93	137	149	141	152,535	248,801	293,428	551,761	530,652	644,390	690,608	671,250
French	60	44	51	83	90	127	115	124	114,664	155,889	190,171	386,640	421,752	580,769	534,505	627,760
Spanish	41	44	9	45	31	46	32	2	106,651	117,400	27,264	172,572	121,461	157,465	117,528	4,209
Other Nationalities	79	113	112	299	538	896	959	447	272,133	338,490	342,287	1,159,847	1,657,045	2,704,894	3,463,001	1,684,704
Totals . . .	2,478	2,892	2,736	5,230	5,197	6,456	6,413	6,185	8,546,044	11,415,876	11,417,459	26,148,878	24,774,591	29,458,634	29,837,794	29,980,614

ABOVE AS PERCENTAGES.

	1920.	1921.	1922.	1924.	1926.	1928.	1929.	1930.	1920.	1921.	1922.	1924.	1926.	1928.	1929.	1930.
British	30·4	33·6	34·2	24·2	27·4	28·6	27·8	24·8	32·3	34·8	33·3	23·3	28·4	30·4	30·1	26·7
American (U.S.A.)*	45·6	41·8	40·0	56·3	46·8	42·6	42·1	46·7	44·4	42·6	43·5	60·5	50·7	46·7	44·7	48·5
German † . . .	—	—	—	—	—	—	—	6·1	—	—	—	—	—	—	—	4·8
Norwegian . . .	4·3	4·9	4·1	2·6	5·9	4·8	5·3	6·0	4·7	4·8	3·4	2·1	4·0	4·0	4·3	5·5
Japanese . . .	4·8	4·7	6·9	3·3	2·5	2·9	2·4	2·6	6·0	5·4	7·6	3·1	3·8	3·1	2·6	2·7
Chilian	3·2	2·2	2·0	0·8	5·0	0·5	0·5	0·8	2·5	1·4	1·3	0·7	0·5	0·5	0·4	0·6
Danish	0·3	2·1	2·0	1·2	1·2	1·1	1·6	1·5	0·4	2·1	2·0	0·9	1·0	1·0	1·4	1·3
Peruvian	3·0	2·1	2·2	1·3	1·2	0·8	0·7	0·0	2·2	1·4	1·4	0·7	0·6	0·5	0·4	0·0
Dutch	1·2	1·7	2·4	2·0	1·8	2·1	2·3	2·3	1·8	2·2	2·6	2·1	2·1	2·2	2·3	2·2
French	2·4	1·5	1·8	1·6	1·7	2·0	1·8	2·0	1·3	1·4	1·7	1·5	1·7	2·0	1·8	2·1
Spanish	1·6	1·5	0·3	0·9	6·0	0·7	0·5	0·0	1·2	1·0	0·2	0·7	0·5	0·5	0·4	0·0
Other Nationalities	3·2	3·9	4·1	5·8	0·5	13·9	15·0	7·2	3·2	2·9	3·0	4·4	6·7	9·1	11·6	5·6
Totals . . .	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0

* Includes Vessels engaged in the coasting trade of the U.S.A., which is carried on *entirely* by National Ships.

† **Included with "Other Nationalities" in previous years.**

Cargoes (in tons weight) carried in Commercial Vessels that passed through the Panama Canal during the Years ended 30th June, 1920, 1921, 1922, 1924, 1926, 1928, 1929, and 1930, distinguishing the Principal Nationalities.

Nationality of Vessels.	Weight of Cargoes carried.							
	1920.	1921.	1922.	1924.	1926.	1928.	1929.	1930.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
British . .	2,830,268	3,738,257	3,329,861	6,051,842	6,750,843	8,075,022	8,331,221	7,572,969
American (U.S.A.)	4,547,140	5,163,025	4,950,519	16,654,435	13,710,956	14,258,735	14,075,731	14,499,233
German * .	—	—	—	—	—	—	—	1,388,022
Norwegian .	404,323	637,887	408,268	539,101	1,051,276	1,268,124	1,505,366	1,808,278
Japanese .	726,338	758,617	1,044,515	935,245	667,982	1,041,166	980,041	1,009,735
Chilian . .	104,738	61,737	46,182	107,147	82,695	81,678	98,584	105,511
Danish . .	42,533	322,059	272,779	317,274	295,530	380,240	518,452	505,914
Peruvian .	119,418	105,322	64,370	102,136	94,778	96,175	69,573	13,107
Dutch . .	128,442	216,488	290,573	573,929	552,741	637,178	695,956	618,718
French . .	125,249	132,836	139,463	407,249	398,393	600,421	530,763	576,753
Spanish . .	101,563	143,076	23,701	67,903	49,956	104,606	95,405	8,250
Other Nationalities .	244,487	319,910	314,679	1,238,449	2,382,298	3,097,364	3,761,914	1,923,742
Totals .	9,374,499	11,599,214	10,884,910	26,994,710	26,037,448	29,630,709	30,663,006	30,030,232

Above as Percentages.

	1920.	1921.	1922.	1924.	1926.	1928.	1929.	1930.
British . .	30·2	32·2	30·6	22·4	25·9	27·2	27·1	25·2
American (U.S.A.)	48·5	44·5	45·5	61·7	52·7	48·2	45·9	48·3
German * .	—	—	—	—	—	—	—	4·6
Norwegian .	4·3	5·5	3·7	2·0	4·0	4·3	4·9	6·0
Japanese .	7·7	6·5	9·6	3·5	2·6	3·5	3·2	3·4
Chilian . .	1·1	0·5	0·4	0·4	0·3	0·3	0·3	0·4
Danish . .	0·5	2·8	2·5	1·2	1·1	1·3	1·7	1·7
Peruvian .	1·3	0·9	0·6	0·4	0·4	0·3	0·2	0·0
Dutch . .	1·4	1·9	2·7	2·1	2·1	2·2	2·3	2·1
French . .	1·3	1·2	1·3	1·5	1·5	2·0	1·7	1·9
Spanish . .	1·1	1·2	0·2	0·3	0·2	0·3	0·3	0·0
Other Nationalities .	2·6	2·8	2·9	4·5	9·2	10·4	12·4	6·4
Totals .	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0

* Included with "Other Nationalities" in previous years.

FREIGHT RATES.

ESTIMATED AVERAGE RATES OF FREIGHT FOR STEAMERS IN THE OPEN MARKET, FOR VARIOUS YEARS.

OUTWARD.
From Tyne and N.E. Coast ports.

To	1920.		1921.		1924.		1925.		1928.		1929.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
River Plate	—		19	10	13	0	16	2½	12	3	15	5½
Port Said	41	3	15	4	10	11¼	10	4	10	4½	11	0
Alexandria	—		16	11	11	5	10	0	10	4	11	10½
Barcelona	34	0	16	8	12	5½	12	0	11	11¾	13	5
Oporto	46	6	16	6	13	0	10	9	8	7	9	9¾
Canary Islands	—		12	10	9	1½	8	10½	8	7	9	8¾
Bordeaux	38	10	8	11	5	10	5	2½	5	5¾	6	8
Bilbao	—		12	10	7	11½	7	9	8	0¼	9	6¾
Stockholm	—		10	7	5	11¼	5	6½	—		6	2
Rotterdam	17	3½	8	7	4	3¾	3	10	3	11¼	4	3¼
Hamburg	10	3	6	10½	4	5½	3	10½	—		—	
Algiers	51	5	13	2	9	4½	8	9	8	5	9	6

HOMEWARD.
To U.K. or Continent, except where otherwise stated.

From	1920.		1921.		1924.		1925.		1928.		1929.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
River Plate (Lower Ports)	118	6	35	8	23	9¼	15	5	20	1¼	20	10¾
River Plate (San Lorenzo)	125	0	45	1	25	9¼	17	9	22	2	22	0¼
New Orleans or Galveston *	—		7	2	4	2½	3	3½	—		—	
Calcutta	106	10	25	0	30	1	28	11	—		—	
Karachi	84	6	28	4	23	8½	22	9¼	22	6¼	—	
Rice Ports	112	0	34	2	32	8¾	29	7¾	26	4	26	4½
Bombay (d.w.)	86	0	24	10	26	1¾	23	8	19	3½	22	0¾
Odessa, etc. (direct)	—		—		14	10	13	0¼	11	7¾	13	9¼
Danube	60	2	25	10	19	10¾	16	8¾	14	7	17	11¾
Sulina (direct)	56	0	—		15	10½	16	10¼	11	2½	13	0½
Bilbao †	25	1¾	10	2	6	8	6	3	6	0½	6	6¾
Huelva	28	1	10	8	8	5½	6	5	8	8	9	7½

* Net Charter.

† To Tyne.

"LAID-UP" STEAM TONNAGE OF PRINCIPAL MARITIME COUNTRIES.

	Jan. 1st, 1925.	Jan. 1st, 1926.	Jan. 1st, 1927.	Jan. 1st, 1928.	Jan. 1st, 1929.	July 1st, 1929.	Jan. 1st, 1930.	July 1st, 1930.
	Gross tons.	Gross tons.	Gross tons.	Gross tons.	Gross tons.	Gross tons.	Gross tons.	Gross tons.
Gt. Brit. & Ireland	705,000	613,000	529,000	575,000	528,000	610,000	564,000	1,470,000
Australia . . .	166,000	51,000	71,000	†	†	†	†	†
United States :—								
Shipping Board .	3,664,000	3,518,000	2,336,000	2,405,000	2,144,000	1,799,000	1,588,000	1,509,000
Ship. Bd. Tankers	125,000	134,000	56,000	†	†	†	†	†
Govt. owned, other than U.S. S. Bd.	17,000	16,000	27,000	†	†	†	†	†
Privately owned .	417,000	458,000	457,000	726,000	818,000	433,000	666,000	587,000
U.S. total .	4,223,000	4,120,000	2,876,000	3,131,000	2,962,000	2,232,000	2,254,000	2,096,000
Belgium . . .	26,000	21,000	14,000§	†	†	†	†	†
Denmark . . .	—	63,000	20,000	†	†	†	†	†
France	311,000	134,000	118,000	177,000	133,000	75,000	†	†
Greece	24,000	99,000	106,000§	77,000	74,000	59,000	87,000	†
Holland . . .	65,000	109,000	3,000	16,000	9,000	7,000	4,000	193,000
Italy	225,000*	225,000	110,000	312,000	250,000	226,000	170,000	†
Japan	25,000	35,000	48,000	49,000	46,000	41,000	44,000	43,000
Norway	25,000	22,000	37,000§	136,000	19,000	12,000	13,000	†
Spain	60,000	44,000	35,000	52,000	31,000	29,000	25,000	†
Sweden	20,000	30,000	9,000	28,000	2,000	1,000	2,000	†
Other Countries ‡ .	103,000	279,000	100,000	†	†	†	†	†
World's total .	5,978,000	5,845,000	4,076,000	3,978,000*	4,054,000*	3,292,000*	3,163,000*	3,802,000*

* Estimated. † No data available. ‡ Mainly belonging to countries shown above.
§ Figures at October, 1926, available only.

PAY IN THE MERCHANT SERVICE.—MONTHLY RATES.

*Foreign-going Cargo Steamers.**

Rating.	1914.	1924.†	1925–30.‡
	£ s. £ s.	£ s. £ s.	£ s. £ s.
First Mates . . .	12 5 to 14 5	17 10 to 26 10	16 0 to 25 0
Second Mates . .	9 5 „ 12 15	15 0 „ 18 10	13 10 „ 17 0
Third Mates . .	7 10 „ 10 10	13 0 „ 14 0	11 10 „ 12 10
Chief Engineers .	16 15 „ 24 0	21 10 „ 34 10	20 0 „ 33 0
Second Engineers .	12 5 „ 14 15	17 10 „ 26 10	16 0 „ 25 0
Third Engineers .	8 15 „ 11 15	15 0 „ 18 10	13 10 „ 17 0
Carpenters . . .	7 0 „ 7 10	12 10 „ 16 10	11 10 to 15 10
Boatswains . . .	6 5 „ 6 10	11 10 (Fixed rate.)	10 10 (Fixed rate.)
Firemen	5 10 „ 6 0	10 10 „	9 10 „
Able Seamen . .	5 0 „ 5 10	10 0 „	9 0 „

* On Oil-Tank Vessels, the 1924, 1926 and 1927 rates are supplemented by the following percentage additions :—

Chief Engineers . . . . 12½ per cent.
First Mates and Second Engineers . . . . . . 10 „
Other Mates and Engineers . . . . 7½ „

On Motor Vessels there is a special National Standard Scale of Pay for Engineer Officers substantially higher than on steam-driven vessels.

† The 1924 figures are the National Maritime Board standard rates of pay, effective from September 5, 1924, and based, in the case of Navigating and Engineer Officers, on tonnage and seniority.

‡ National Maritime Board standard rates effective from August 1st, 1925.

On Passenger Liners, Navigating and Engineer Officers, as a rule, receive now, as before the War, wages from 10 to 25 per cent. higher than the Standard Cargo-Vessel rates.

EXPORTS OF NEW SHIPS FROM THE UNITED KINGDOM.

Ships not Registered as British, with their Machinery.

Year.	War Vessels (including Machinery and Armament).	Steam Ships (other than War Vessels).		Sailing Ships (other than War Vessels) including Boats.	Total of New Ships.
		Hulls and Fittings.	Machinery.		
	£	£	£	£	£
1903	74,480	2,798,737	1,222,108	188,504	4,283,829
1904	388,600	2,570,835	1,164,779	330,937	4,455,151
1905	50,000	3,693,422	1,516,183	171,693	5,431,298
1906	2,800,000	3,973,873	1,668,592	201,706	8,644,171
1907	554,700	6,586,449	2,550,702	326,262	10,018,113
1908	1,879,994	5,902,428	2,505,280	189,773	10,567,475
1909	247,000	3,698,556	1,819,618	161,940	5,927,114
1910	4,894,500	2,553,427	1,209,119	113,158	8,770,204
1911	25,000	3,745,349	1,632,402	259,564	5,663,115
1912	765,000	4,243,308	1,750,351	268,503	7,027,162
1913	2,617,100	5,867,179	2,336,509	205,742	11,026,530
1914	308,385	4,716,226	1,784,900	123,043	6,932,554
1915	—	1,170,606	472,597	49,548	1,692,661
1916	20,000	754,372	481,703	34,510	1,290,585
1917	—	706,084	347,354	33,869	1,087,307
1918	—	778,525	229,292	39,517	1,047,334
1919	—	1,703,961	505,652	118,718	2,328,331
1920	—	26,280,243		295,771	26,576,016
1921	—	29,523,833		470,615	29,994,448
1922	—	30,222,080		220,435	30,442,515
1923	—	9,566,187		148,474	9,714,661
1924	—	5,257,957		264,388	5,522,345
1925	14,354	5,996,585		265,384	6,276,323
1926	19,300	4,314,414		296,265	4,629,979
1927	45,388	4,233,509		251,758	4,530,655
1928	5,143,150	10,439,794		315,630	15,575,749
1929	3,820,250	11,487,076		203,840	15,511,166

HIGHEST AND LOWEST IRON AND STEEL PRICES, 1914–1930.

	1914.			1918.			1920.			1924.			1926.			1928.			1930.		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
Marked Iron Bars, S. Staffs	9	0	0	20	0	0	33	10	0	15	0	0	14	10	0	12	10	0	12	10	0
	8	10	0	14	15	0	26	15	0	14	10	0	14	0	0	12	0	0			
Common Iron Bars, Cleveland	8	2	6	20	0	0	30	0	0	12	10	0	12	10	0	10	5	0	10	15	0
	7	10	0	14	15	0	24	5	0	12	0	0	11	5	0	10	5	0			
Steel Ship Plates, $\frac{3}{8}$-in., Middlesbrough	7	10	0	16	10	0	24	10	0	10	10	0	8	12	6	8	2	6*	8	15	0*
	7	0	0	11	10	0	20	0	0	9	10	0	7	5	0	8	7	6*			
Steel Ship Angles, Middlesbrough	7	5	0	16	2	6	24	0	0	10	0	0	7	17	6	7	12	6*	8	7	6*
	6	15	0	11	2	6	19	10	0	9	5	0	7	0	0	7	17	6*			
Steel Ship Plates, Glasgow	7	5	0	16	10	0	28	5	0	12	10	0	8	5	0	8	2	6*	8	15	0*
	6	17	6	11	10	0	21	10	0	9	15	0	7	7	6	8	7	6*			
Steel Ship Angles, Glasgow	7	0	0	18	2	6	26	10	0	10	0	0	8	2	6	7	12	6*	8	7	6*
	6	7	6	11	2	6	19	10	0				6	17	6	7	17	6*			
Steel Boiler Plates, Middlesbrough	8	5	0	17	10	0	31	0	0	14	0	0	11	10	0	11	0	0	10	10	0
	8	0	0	12	10	0	23	0	0	13	0	0	11	5	0	11	10	0			
Steel Boiler Plates, Glasgow	7	5	0	17	10	0	31	10	0	14	0	0				10	10	0	10	10	0
	7	0	0	12	10	0	24	0	0	13	0	0	11	0	0	10	10	0			

* Subject to rebate.

FLUCTUATIONS IN THE PRICE OF A NEW, READY, 7,500-TON (D.W.)† CARGO STEAMER.

Period.		Price per ton (D.W.)
	£	£
1900 (Nov.)	60,630*	8·4
1905 (June)	36,500	5·0
1908 (June)	**36,000**	4·9
1910 (Jan.)	39,000	5·3
1912 (Nov.)	58,000	7·7
1914 (June)	42,500	5·7
1915 (Jan.)	60,000	8·0
1915 (June)	82,500	11·0
1916 (Jan.)	125,000	16·7
1916 (Dec.)	187,500	25·0
1918 (Jan.)	165,000	22·0
1918 (June)	180,500	24·1
1919 (Jan.)	169,000	22·5
1919 (June)	195,000	26·0
1920 (Jan.)	232,500	31·0
1920 (March)	**258,750**	34·5
1920 (June)	180,000	24·0
1921 (Jan.)	105,000	14·0
1921 (June)	63,750	8·5
1922 (Jan.)	60,000	8·0
1922 (June)	62,000	8·3
1923 (Jan.)	65,625	8·8
1923 (June)	62,500	8·3
1924 (Jan.)	60,000	8·0
1924 (June)	60,000	8·0
1925 (Jan.)	61,500	8·2
1925 (June)	55,500	7·4
1926 (Jan.)	52,500	7·0
1926 (June)	52,500	7·0
1927 (Jan.)	60,750	8·1
1927 (June)	63,000	8·4
1928 (Jan.)	62,000	8·3
1928 (June)	57,000	7·6
1929 (Jan.)	62,000	8·3
1929 (June)	60,000	8·0
1930 (Jan.)	67,750	9·0
1930 (June)	67,750	9·0

Compiled from "Fairplay," July 3, 1930.

NOTE.—The highest and lowest prices are given in heavy type.

* Highest pre-War figure.

† The table is now based on a single-deck steamer of very plain specification, built to Lloyd's Register latest rules, partly of continental steel, with no deep tank, donkey boiler, or Grain Act requirements; length 380 ft., breadth 49 ft., depth 29 ft., carrying 7500 tons deadweight at 10½ knots on 23′ 8″ draught.

From 1898 to 1906 the vessel used was 360 ft. long by 48 ft. beam by 30′ 10″ depth, carrying 7000 to 7250 tons deadweight on 24′ 6″ draught. In 1906 the revised Board of Trade rules enabled the freeboard to be reduced, thus increasing the deadweight by 60 to 80 tons, while in 1910 changes in the Rules of Lloyd's Register of Shipping permitted of lighter scantlings, adding 150 tons to the deadweight.

OCEAN DISTANCES FROM THE BRITISH ISLES.

(Steaming Distances in Nautical Miles.)

I.—CONTINENT.

	Archangel.	Christiania	Copenhagen.	Stockholm.	Danzig.	Hamburg.	Amsterdam.	Rotterdam.	Antwerp.	Havre.	Bordeaux.	Bilbao.	Lisbon.	Gibraltar.
Cardiff .	2,259†	1,060*	1,126*	1,498*	1,400*	839	577	553	541	367	531	561	878	1,145
Glasgow .	2,036†	930†	996†	1,408†	1,280†	490	818	794	782	610	778	808	1,093	1,400
Liverpool .	2,104†	1,005†	1,066†	1,478†	1,340†	942	711	687	675	503	671	701	1,010	1,290
London .	2,106	702	700	1,180	989	427	188	177	180	198	682	712	1,058	1,325
Sunderland	1,755	520	586	998	860	413	258	266	327	397	896	915	1,225	1,615

* South about. † North about.

II.—MEDITERRANEAN, BLACK SEA AND RED SEA.

	Marseilles.	Naples.	Messina.	Malta.	Genoa.	Trieste.	Athens.	Constantinople.	Odessa.	Batoum.	Smyrna.	Alexandria.	Port Said.	Aden.
Cardiff .	1,870	2,080	2,170	2,135	2,039	2,804	2,630	2,910	3,230	3,490	2,765	2,922	3,075	4,515
Glasgow .	2,085	2,295	2,475	2,350	2,254	3,019	2,864	3,125	3,445	3,705	2,980	3,137	3,300	4,730
Liverpool .	1,975	2,265	2,367	2,240	2,144	2,909	2,759	3,069	3,335	3,595	2,870	3,083	3,290	4,620
London .	2,050	2,260	2,354	2,315	2,219	2,984	2,810	3,190	3,410	3,670	2,945	3,122	3,248	4,695
Sunderland	2,222	2,540	2,520	2,511	2,381	3,164	2,990	3,370	3,690	3,950	3,225	3,382	3,445	4,975

III.—AFRICA AND EASTERN ATLANTIC, ETC.

	Azores.	St. Vincent (C.V.I.)	Las Palmas.	Bathurst.*	Freetown.	Lagos.	Ascension.	Loanda.†	St. Helena.	Cape Town.	Durban.	Mauritius.‡	Melbourne‡ (Australia).	Hobart‡ (Tasmania).
Cardiff .	1,330	2,345	1,523	2,484	2,838	3,968	3,775	4,841	4,472	5,947	6,721	8,273	11,761	11,785
Glasgow .	1,495	2,560	1,745	2,706	3,059	4,189	3,940	5,056	4,637	6,168	6,942	8,494	11,982	12,006
Liverpool .	1,385	2,450	1,655	2,616	2,962	4,097	3,830	4,946	4.527	6,076	6.850	8,402	11.890	11,914
London .	1,460	2,525	1,699	2,660	3,008	4,138	3,900	5.021	4,597	6,117	6,891	8,443	11,931	11,955
Sunderland	1,740	2,805	1,890	2,851	3,199	4,329	4.185	5,301	4,882	6,308	7.082	8,834	12,122	12.146

* *Via* Teneriffe and Dakar. † *Via* St. Vincent (C.V.I.). ‡ *Via* Cape Town.

IV.—INDIAN OCEAN, ETC. (*via* SUEZ).

	Karachi.	Bombay.	Colombo.	Zanzibar.	Mauritius.	Madras.	Calcutta.	Rangoon.	Singapore.	Batavia.	Freemantle (W. Australia)	Adelaide.	Melbourne.	Hobart.
Cardiff .	5,930	6,150	6,615	6,195	6,825	7,016	7,610	7,845	8,165	8,450	9,745	10,712	11,070	11,100
Glasgow .	6,145	6,365	6.830	6,433	7,040	7,120	7,854	8,060	8,380	8,635	9,960	10,953	11,285	11,315
Liverpool .	6,135	6,255	6,720	6,220	6,930	7,065	7,750	7,955	8,270	8,555	9,850	10,847	11,175	11,330
London .	6,110	6,330	6.535	6,295	7,005	7,040	7,795	7,935	8,345	8,630	9,665	10,890	11,250	11,380
Sunderland	6,390	6,610	6.975	6.575	7,285	7,250	7,986	8.135	8.625	8,815	10.105	11,090	11,420	11,560

V.—CHINA, JAPAN, ETC. (*via* SUEZ).

	Saigon.	Hong Kong.	Shanghai.	Nagasaki.	Yokohama.	Vladivostock.*	Fiji Islands.	Manilla.	Brisbane (*via* Torres Strait.)	Sydney (N.S.W.)	Auckland (N.Z.)	Wellington (N.Z.)	Honolulu.	San Francisco.
Cardiff .	8,805	9,718	10,470	10,595	11,065	11,250	11,540	9,470	11,788	11,520	12,400	12,420	13,150	13,490
Glasgow .	9,020	9,815	10,712	10,819	11,280	11,414	11,755	9.814	12.028	11,764	12,655	12,660	13,365	13,705
Liverpool .	8,910	9.856	10,665	10,700	11,170	11,355	11,645	9,575	11,924	11,600	12,545	12,560	13,955	13,795
London .	8,985	9,900	10,650	10,775	11,245	11,430	11,720	9,750	11,961	11,708	12,625	12,612	14,010	13,800
Sunderland	9,265	10,060	10,820	11,055	11,525	11,710	12.000	9,930	12,152	11,900	12,790	12,850	14,220	13,950

* *Via* Nagasaki.

VI.—AMERICA.

	Quebec.	Halifax, N.S.	New York.	Boston.	Jamaica.	New Orleans.	Panama.	Colon.	Pernambuco.	Bahia.	Rio de Janeiro.	Montevideo.	Buenos Ayres.	Valparaiso.
Cardiff .	2,750	2,505	3,065	2,782	4,030	4,510	4,527	4,487	3,950	4,375	5,020	5,990	6,100	8,690
Glasgow .	2,618	2,390	3 280	3,065	4,245	4,725	4,665	4,625	4,165	4,540	5,235	6,205	6,315	8,905
Liverpool .	2,655	2,455	3,052	2,805	4,135	4,615	4,570	5,530	4,055	4,430	5,125	6,095	6,205	8,795
London .	3,072	2,685	3,245	3,030	4,210	4,790	4,782	4,742	4,130	4,505	5,200	6,370	6,280	8,870
Sunderland	3,240	2,665	3,450	2,803	4,490	4,970	4,975	4,925	4,410	4,785	5,480	6,450	6,560	9,250

BRITISH NAVAL AND SHIPPING ORGANISATIONS.

Aberdeen Shipbuilders' Association: Chairman, A. Hall Wilson; Secretary, James Hay: Address, 6, Bon Accord Square, Aberdeen.

Amalgamated Engineering Union: Chairman, J. T. Brownlie, C.B.E.; Secretary, A. H. Smethurst: Address, 110, Peckham Road, London, S.E. 15.

Amalgamated Marine Workers' Union: President, A. Cannon: Secretary, J. McKinlay: Address,

Average Adjusters, Association of: Chairman, The Hon. Mr. Justice Roche; Secretary, A. F. Greenwood: Address, 70, Old Broad Street, London, E.C. 2.

Baltic Mercantile and Shipping Exchange, Ltd.: Chairman, John E. Parry; Secretary, J. A. Findlay: Address, 24–28, St. Mary Axe, London, E.C. 3.

Barrow Shipbuilders' Association: Chairman, John Barr, C.B.E.; Secretary, G. P. Lancaster: Address, Naval Construction Works, Barrow-in-Furness.

Belfast Shipowners' Association: Chairman, Sir Thos. Dixon, Bt., H.M.L.,; Hon. Secretaries, G. Heyn & Sons, Ltd.; Telephones, Belfast 7101 (4 lines); Telegrams, "Heyn, Belfast": Address, Head Line Buildings, Victoria Street, Belfast.

Birkenhead Shipbuilding Employers' Association: Chairman, R. S. Johnson, O.B.E.; Secretary, H. M. Hinchliffe: Address, Shipbuilding and Engineering Works, Birkenhead.

Blacksmiths' Forge and Smithy Workers' Society (Associated): Secretary, William Lorimer: Address, 177, Hill Street, Charing Cross, Glasgow, C.3

Boiler Makers and Iron Shipbuilders' Society: Chairman, Mark Hodgson; Vice-Chairman, C. W. Church; General Secretary, John Hill, J.P.; Assistant Secretary, Councillor John Barker: Address, Lifton House, Eslington Road, Newcastle-on-Tyne.

Border Counties Engineering Employers' Association: Secretary, James Cameron; Telephones, Newcastle Central 5111 and 5112: Address, Bolbec Hall, Westgate Road, Newcastle-on-Tyne.

Bristol Steamship Owners' Association: President, J. H. Bennett; Hon. Secretary and Treasurer, A. S. Ray; Telephone, Bristol 1836: Address, 18, St. Augustine's Parade, Bristol.

Britannia Steam Ship Insurance Association, Ltd.: Chairman, Sir Ernest W. Glover, Bt.; Managers, Tindall, Riley & Co.: Address, 17, Gracechurch Street, London, E.C. 3.

British Association of Refrigeration: President, Sir William B. Hardy, F.R.S.; Hon. Secretary, J. Raymond: Address, Empire House, St. Martin's-le-Grand, London, E.C.1.

British Bankers' Association: President, Mr. F. C. Goodenough; Secretary, E. Sykes; Telephone, Avenue 3103: Address, 5, Bishopsgate, E.C. 2.

British Chambers of Commerce, Association of: President, Sir Walter Raine, J.P.; Deputy President, Sir William Clare Lees, O.B.E., J.P.; Secretary, R. B. Dunwoody, C.B.E.; Telephone, Victoria 3154; Address, 14, Queen Anne's Gate, S.W.1.

British Coal Exporters' Federation: Secretary, R. M. Stewart; Telephone, Victoria 3679: Address, 27, Abingdon Street, S.W. 1.

British Coasting & Near Trades Shipowners' Association: Chairman, T. E. Brown; Secretary, J. G. Rutherford: Address, 45 & 46, West Sunniside, Sunderland.

British Corporation Register of Shipping and Aircraft,: Hon. President, Sir Archibald Denny, Bt., LL.D.; Hon. Vice-President, Francis Henderson; Chairman, Robert Clark; Vice-Chairman, Gilbert J. Innes; Chief Surveyor, J. Foster King, C.B.E.; Secretary, John Fleming; Telephone Numbers, Cent. 8152 and 8153; Telegraphic Address, "Seaworthy, Glasgow": Address, 14, Blythswood Square, Glasgow.

British Engineering Standards Association: Chairman, Maurice F. G. Wilson; Director and Secretary, C. le Maistre, C.B.E.; Telephone, Victoria 3127: Address, 28, Victoria Street, London, S.W.1.

British Engineers' Association, Inc.: President, Sir Gilbert C. Vyle; Secretary, Henry E. Jones: Address, 32, Victoria Street, London, S.W. 1.

British Industries, Federation of: President, Colonel Sir James Lithgow, Bt., M.C., T.D., D.L., J.P.; Director, Sir Roland Nugent; Deputy Director, Mr. G. H. Locock, C.M.G.; Secretary, Mr. D. L. Walker: Address, Tothill Street, London, S.W. 1.

British Marine Mutual Insurance Assn., Ltd.: Chairman, E. T. Lindley; Managers, E. R. Evans & Co.; Telephone, Monument 0200: Address, 12, Lime Street, E.C. 3.

British Maritime Committee: Chairman, The Rt. Hon. Lord Merrivale, P.C.; Hon. Secretary, G. P. Langton, K.C.; Asst. Hon. Secretary, G. St. C. Pilcher; Telephone, Cent. 2251: Address, 4, King's Bench Walk, Temple, E.C. 4.

British Mercantile Marine (National Maritime Board): Chairman, F. C. Allen; General Secretary, G. A. Vallance; Telephone, Holborn 3074; Telegrams, "Joiseo, London": Head Office, 3 and 4, Clements Inn, London, W.C. 2.

British Nautical Instrument Trade Association: Secretaries, Biggart, Lumsden & Co.: Address, 105, West George Street, Glasgow, C. 2.

British Passenger Agents' Association: President, 1930/31, Robert Dring (Messrs. J. W. Eaton & Co.); Hon. Secretary, Charles Wright: Address, 22, Watergate Street, Chester.

British Sailing Ship Owners' Association, Ltd.: Chairman, A. Anderson; Secretary, H. E. Gorick: Address, 24, St. Mary Axe, London, E.C. 3.

British Sailors' Society, Inc.: Founded 1818. President, The Rt. Hon. Lord Radstock, C.B.E.; Hon. Treasurer, Sir Ernest Glover, Bart.; Chairman of Board, Admiral Sir William Goodenough, G.C.B., M.V.O.; General Secretary, Mr. Herbert E. Barker; Telephones, East 4350–1; Telegrams, "Sailordom, Step, London": Address, The Passmore Edwards Sailors' Palace, 680, Commercial Road, London, E. 14.

Bureau Veritas: Chief Representative for the U.K., G. M. Milne: Address, 155 Fenchurch Street, London, E.C. 3.

Cardiff and Bristol Channel Incorporated Shipowners' Association: Chairman, Richard H. Read; Secretary, W. R. Hawkins; Assistant Secretary, V. W. Hawkins; Telephone, Cardiff, 242; Telegrams, "Ships, Cardiff"; Address, 6, The Exchange, Cardiff.

Chamber of Shipping of the United Kingdom: President, Sir Arthur Sutherland, Bt., K.B.E.; Vice-President, David Jones, Esq., J.P. General Manager, H. M. Cleminson; Assistant General Manager, P. M. Hill; Secretary, H. J. Spratt; Telephone, Avenue 7360; Telegrams, "Logboard, Stock, London": Address, 28, St. Mary Axe, London, E.C. 3.

Chartered Shipbrokers, Institute of: President, Sir R. Burton Chadwick, M.P.; Secretary, J. A. Findlay: Address, 24, St. Mary Axe, London, E.C. 3.

Clyde Shipbuilders' Association, The: President, J. Garrick; Secretary, D. Higgins: Address, Fyfe Chambers, 105, West George Street, Glasgow.

Clyde Steamship Insurance Association, Ltd.: Chairman, William McInnes; Secretaries, Walter Patterson, M.B.E., J.P., and Wm. Brash: Address, 94, Hope Street, Glasgow.

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Company of Master Mariners, Honourable: Master H.R.H. The Prince of Wales, K.G.; Deputy Master, Captain Sir Burton Chadwick, M.P., R.N.R.; Secretary, W. T. C. Smith: Address, 84, Leadenhall Street, London, E.C. 3; Tel. No. Avenue 8048.

Consulting Marine Engineers and Ship Surveyors, The Society of: President, J. L. Richardson; Vice-Presidents, T. G. Gordon and I. H. Buchanan; Secretary, R. K. Munro: Address, 6, Lloyd's Avenue, London, E.C. 3.

Dock and Harbour Authorities' Association: President, Mr. B. L. Nairn (Chairman Dundee Harbour Trust); Hon. Secretary, Sir William C. Thorne: Address, 13, Victoria Street, S.W. 1.

Documentary Committee: Chamber of Shipping; Chairman, Sir F. Vernon Thomson; K.B.E.; Vice Chairman, Mr. William A. Young; Secretary, R. B. Brown; Telephone, Avenue 7360: Address, 28, St. Mary Axe, E.C. 3.

Dundee Shipbuilders' Association: President, Grant Barclay; Chairman, Mr. Henry Main; Secretary, Robert Fothergill: Address, Stannergate Shipyard, Dundee.

Dundee Shipowners' and Shipbrokers' Association: Honorary Secretary, William Kinnear, 18, Commercial Street, Dundee.

Empire Steamship Assurance Association, Ltd.: Managers, A. Bilbrough & Co., Ltd.; Address, Walsingham House, 35, Seething Lane, London, E.C. 3.

Employers' Association of the Port of Liverpool: Chairman, Charles Booth; Secretary, W. Awstun Jones: Address, Dock Board Building, Pier Head, Liverpool.

Engineering and Allied Employers' East of Scotland Association: President, W. Wallace; Secretary, A. Gray Muir: Address, 19, York Place, Edinburgh.

Engineering and Allied Employers' National Federation: Chairman, Sir Allan MacGregor Smith, K.B.E., M.A., LL.B.; Joint Secretaries, James Brown and W. G. Campbell; Telephone, Vic. 8280: Address, Broadway House, Tothill Street, Westminster, S.W. 1.

Engineering and Allied Employers' National Federation, Birkenhead and District Association: Chairman, R. S. Johnson, O.B.E.; Secretary, Herbert M. Hinchliffe: Address. Shipbuilding and Engineering Works, Birkenhead.

Engineering and Shipbuilding Draughtsmen, Association of: Secretary, Peter Doig; Address, 96, St. George's Square, London. S.W. 1.

Engineering and Shipbuilding Trades, Federation of: President, Will Sherwood; Vice-President, E. Pacey; Treasurer, W. Lorimer; Secretary, F. Smith; Telephone, Terminus 3840: Address, 324, Gray's Inn Road, London, W.C. 1.

Fisheries Organization Society, Ltd.: President, Cecil B. Harmsworth; Joint Secretaries, S. E. Elliott and W. J. Lord: Address, 26, Eccleston Street, London, S.W. 1.

Fishing Vessels Co-operative Insurance Society, Ltd.: President, Cecil B. Harmsworth; Secretary, W. J. Lord: Address, 26, Eccleston Street, London, S.W. 1.

General Register and Record Office of Shipping and Seamen: Registrar-General, Paymaster Commander J. Blake Harrold, O.B.E., R.N.R.; Assistant Registrar-General, C. F. Knight; Senior Staff Officer, F. Middleton; Telephones, Royal 0774–0777; Telegrams, "Registrar, Seamen (Ald.) London": Address, Tower Hill, London, E.C. 3.

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Glasgow Shipowners' Association: Chairman, W. S. Workman; Deputy Chairman, W. Betts Donaldson; Secretary, Jas. A. Mackenzie; Telephone, Central 6606 (4 lines), Glasgow; Telegrams, "Maritime, Glasgow": Address, 150, St. Vincent Street, Glasgow. C. 2.

Glasgow Stevedores' Association: President, R. P. Shaw; Vice-President, Wm. H. Bain; Hon. Secretary, James McIntyre: Address, East End Princes Dock, Glasgow.

Goole Steamship Owners' Association: Secretary, J. Umpleby, St. John's Street, Goole.

Gravesend Sea School: Chairman, Commodore The Rt. Hon. H. Douglas King, C.B., C.B.E., D.S.O., R.N.V.R, M.P.; Captain, Captain O. H. Lewis; Secretary, Miss D. A. Wigner: Address, 52, Leadenhall Street, London, E.C. 3.

Hartlepools Shipowners' Society: Chairman, Sir John H. Ropner, Bart.; Secretary, William Allen: Address, 4, Victoria Terrace, West Hartlepool.

Hull Incorporated Chamber of Commerce and Shipping: Chairman, Shipping Section: W. Minnitt Good; Secretary, A. Whitehead: Address, Samman House, Bowlalley Lane, Hull.

Hull Mutual Steamship Protecting Society: Chairman, John R. Rix; Secretaries, Jackson, Beaumont & Co.: Address, Samman House, Bowlalley Lane, Hull.

Humber District Association of Chartered Shipbrokers: Chairman, Sir Arthur J. Atkinson, K.B.E., J.P.; Joint Hon. Secretaries, Wm. Fenton and T. H. Stone: Address, Quay Street, Hull.

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International Chamber of Commerce: President, Mr. Georges Theunis; General Secretary, Edouard Dolleans: Address, 38, Cours Albert 1er, Paris (VIII).

International Chamber of Commerce: British National Committee: Chairman, Sir A. Balfour, Bart., K.B.E.; Secretary, R. W. Hanna: Address, 14, Queen Anne's Gate, S.W. 1.

International Shipping Conference: Secretary, H. M. Cleminson; Assistant Secretary, P. Maurice Hill: Address, 24/28 St. Mary Axe, London, E.C. 3.

International Shipping Federation, Ltd.: President, The Earl of Inchcape, G.C.S.I., G.C.M.G., K.C.I.E., R.N.R., LL.D.; General Manager, Cuthbert Laws; Secretary, Michael Brett: Chief Office, 42, Leadenhall Street, London, E.C. 3.

Isle of Wight Shipbuilding and Engineering Employers' Association: Chairman, P. D. Ewing, C.B.E.; Vice-Chairman, W. R. Watts; Secretary, S. Lovett: Address, c/o J. Samuel White & Co., Ltd., East Cowes, I.o.W.

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Leith Shipowners' Society: Chairman, James Currie, LL.D.; Hon. Secretary, James Low: Address, 7, John's Place, Leith.

Liverpool and London Steamship Protection and Indemnity Association, Ltd.: Chairman, J. Bruce Ismay; Manager and Secretary, Vivian D. Heyne; Assistant Manager, Wm. Goffey; Adviser to the Committee, Sir Norman Hill, Bt.; Telephone, Central 1446 (3 lines); Telegrams, "Grayhill, Liverpool": Address, 10, Water Street, Liverpool.

Liverpool and London War Risks Insurance Association, Ltd.: Chairman, J. Bruce Ismay; Manager and Secretary, Vivian D. Heyne; Assistant Manager, William Goffey; Adviser to the Committee, Sir Norman Hill, Bt.; Telephone, Central 1446 (3 lines); Telegrams, "Warisks, Liverpool": Address, 10, Water Street, Liverpool.

Liverpool Master Porters and Master Stevedores, Association of: Chairman, J. E. Jones; Hon. Secretary, W. H. Boase: Address, 711, Tower Buildings, Liverpool.

Liverpool Navy League Branch: Chairman, Sir Alfred H. Read, J.P.; Hon. Secretary, Commander C. Gore, R.N. (ret.); Telephone, Central 3887: Address, 734, Tower Building, Water Street, Liverpool.

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Liverpool Shipowners' Association: Chairman, J. N. Sellers; Secretaries, Weightman, Pedder & Co.; Telegrams, "Weightman, Liverpool": Address, Barclay's Bank Building, Water Street, Liverpool.

Liverpool Shipping and Forwarding Agents' Association (Inc.): President, David Jones, J.P.; Chairman, G. C. Horton; Secretary, S. L. Jude; Telephone, Bank 485; Telegrams, "Impartial, Liverpool"; Address, Lloyds Bank Building, Victoria Street, Liverpool.

Liverpool Steam Ship Owners' Association: Chairman, W. M. Clarke; Joint Secretaries, Vivian D. Heyne, Martin Hill; Telephone, Central 1446 (3 lines); Telegrams, "Grayhill, Liverpool": Address, 10, Water Street, Liverpool.

Liverpool Underwriters' Association (Inc.): Chairman, Oscar Prentice; Deputy Chairman, S. D. Grundy; Secretary, C. H. Penn: Address, Exchange Buildings, Liverpool.

Lloyd's: Chairman, Percy Hargreaves: Deputy Chairman, Neville Dixey; Principal Clerk, Thomas Devereux; Telephone, Avenue 7100; Telegrams, "Lloyds, London": Address, Lloyd's, London, E.C. 3.

Lloyd's Register of Shipping: Chairman, Sir S. George Higgins, C.B.E.; Deputy Chairman and Treasurer, Arthur L. Sturge; Chief Ship Surveyor, J. Montgomerie, D.Sc.; Chief Engineer Surveyor, H. Ruck-Keene, M.Inst.C.E.; Secretary, Andrew Scott; Telephones, Royal 0811–4; Telegrams, "Committee, Fen, London": Address, 71, Fenchurch Street, London, E.C. 3.

London and District Employers' Association of Boiler Cleaners and Ship Scrapers: Chairman, John Weir; Secretary, E. H. McGuire: Address, 1, Lloyd's Avenue, London, E.C. 3.

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London General Shipowners' Society: Chairman, F. C. Allen, Esq.; Secretary, Douglas T. Garrett; Telephone, Monument 0431: Address, 1, Fenchurch Avenue, London, E.C. 3.

London Master Stevedores' Association: Secretary, C. F. Smith: Address, The Croft, Coolhurst Road, Crouch End, London, N. 8.

London, Port of, Registration Committee: Secretary, F. W. Tritton: Address, 6, Minories, London, E.C. 3.

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Manchester Steamship Owners' Association: Chairman, R. G. Hughes; Hon. Secretary, T. Whyman; Telephone, City 1841, Manchester; Telegrams, "Whyman, Membership, Manchester": Address, 4, Cannon Street, Manchester.

Mansion House Association on Railway and Canal Traffic: President, Major-General S. S. Long, C.B.; Address: 96, Victoria Street, S.W. 1.

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Master Lightermen and Barge Owners (Port of London), Association of: President, A. L. Williams; Secretary, E. J. G. Weare: Telephone, Royal 2280: Address, 24–25, Great Tower Street, London, E.C. 3.

Mercantile Marine Office: Chief Superintendent, Pay Commdr. I. V. Bloomfield, R.D., R.N.R.; Superintendent, Pay-Commdr. E. A. Taffs, R.D., R.N.R.; Cashier, Paymaster Lieut.-Commdr. W. H. Richardson, R.N.R.; Address, Canning Place, Liverpool.

Mercantile Marine Service Association, Inc.: President, Captain C. H. Holttum; Vice-President, Captain J. A. Coverley; Deputy Vice-President, Captain F. Holt Hobson; Hon. Treasurer, Sir John Sandeman Allen, M.P., J.P.; Secretary, Thos. Scott; Telephone, Central 690; Telegrams, "Topmast, Liverpool"; Address, Tower Building, Water Street, Liverpool. London Office, 90, Fenchurch Street, E.C. 3.

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Middlesbrough Keel and Lighter Owners' Association: Chairman, G. Eason; Secretary, J. W. Nellist: Address, Court Chambers, Albert Road, Middlesbrough.

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Missions to Seamen, The: President, The Earl of Athlone, K.G.; Secretary and Treasurer, Stuart C. Knox, M.A.: Address, 11, Buckingham Street, Strand, London, W.C. 2.

Mutual Marine Underwriting Association, Ltd.: Chairman, John C. Denholm; Secretaries, Walter Patterson, M.B.E., J.P., and William Brash: Address, 94, Hope Street, Glasgow.

National Council of Port Labour Employers: Chairman, F. C. Allen; Secretary, Charles Cullen, M.A.: Address, Port of London Authority Building, Savage Gardens, E.C. 3.

National Federation of Iron and Steel Manufacturers: President, Sir W. Peter Rylands, J.P.; Director, Sir Wm. J. Larke; Secretary, M. S. Birkett: Address, Caxton House (East), Tothill Street, S.W. 1.

National Industrial Alliance: Joint Chairmen, Sir Edward Manville, J.P., and Mr. T. Mallalieu, J.P.; Secretary, Douglas Haigh: Telephone, Victoria 2448: Address, Livingstone House, 42, Broadway, London, S.W.1.

National Maritime Board. *See* British Mercantile Marine.

National Sailmaking Employers' Association: President, Wm. M. Rose; Vice-President, A. E. Nickels; Hon. Treasurer, William Douglas; Secretary, David M'Gill, Jr.: Telephone, Central 4535: Telegrams, "Sands, Glasgow": Address, 78, St. Vincent Street, Glasgow.

National Sailors' Society (Inc.): Secretary, Rev. W. Burton, D.D., D. Litt.: Address, 411, East India Dock Road, Poplar, E. 14.

National Union of Seamen: Founder and late General President, J. Havelock Wilson, C.H., C.B.E.; General Secretary, W. R. Spence; Financial Secretary-Treasurer, J. B. Wilson; Assistant General Secretary, G. Gunning: Telephone, Hop 4006; Telegrams, "Searoving, Lamb, London"; Head Office, St. George's Hall, Westminster Bridge Road, London, S.E. 1.

Nautical Almanac Office, H.M.: Superintendent, L. J. Comrie, M.A., Ph.D.: Address, Royal Naval College, Greenwich, London, S.E. 10.

Nautical College, Pangbourne, Reading, Berkshire: Captain Superintendent, Commander A. F. G. Tracy, R.N. (retd.); Managers, Devitt and Moore's Ocean Training Ships, Ltd., 84, Leadenhall Street, London, E.C. 3.

Navy League: President, The Rt. Hon. Lord Lloyd of Dolobran, G.C.S.I., G.C.I.E., D.S.O.; Chairman, Sir Cyril S. Cobb, K.B.E., M.V.O., M.P.; Gen. Secretary, Comdr. H. M. Denny, D.S.O., R.N.; Telephone, Vic. 8586: Address, 13, Victoria Street, London, S.W.1.

Neptune Protecting and Indemnity Assn.: Chairman, S. Marshall; Secretary, George S. Coatsworth: Address, 56, John Street, Sunderland.

Newcastle Protection and Indemnity Association: Chairman, Rt. Hon. Lord Kirkley. Manager, Martin Fryer: Address, Milburn House, Newcastle-on-Tyne.

Newport Shipowners' Association: Chairman, Geo. B. Bailey; Secretary, J. A. Evans: Address, 86, Dock Street, Newport, Mon.

North-East Coast Engineering Employers' Association: Secretary, James Cameron: Address, Bolbec Hall, Westgate Road, Newcastle-on-Tyne.

North-East Coast Shiprepairers' Association: Secretary, James Cameron: Address, Bolbec Hall, Westgate Road, Newcastle-on-Tyne.

North of England Protecting and Indemnity Association: Chairman, Wm. McInnes; Vice-Chairman, R. S. Dalgliesh; Managers, J. Stanley Todd and Frederick Miller; Assistant Managers, J. W. Todd and J. C. Watson; Telephones, Central 5221–2–3; Telegrams, "Norprindem, Newcastle": Head Office, 32, Collingwood Buildings, Newcastle-on-Tyne.

North of England Steamship Owners' Association: President, His Grace the Duke of Northumberland, K.G.; Chairman, E. L. Beckingham; Treasurer, J. T. Lunn; Secretary, William T. Todd; Telephone, Central 7031; Telegrams, "Nemesis, Newcastle-on-Tyne": Address, 21, Mosley Street, Newcastle-on-Tyne.

Port of London Authority: Chairman, Rt. Hon. Lord Ritchie of Dundee; Vice-Chairman, C. F. Leach; General Manager, D. J. Owen: Solicitor and Secretary, J. D. Ritchie, M.C.; Address, Tower Hill, E.C. 3.

Registry of Business Names: Registrar, C. C. Gallagher; Assistant Registrar, F. N. Whittle: Address, N. E. Wing, Somerset House, Strand, London, W.C. 2.

River Thames Dry Dock Proprietors' and Shiprepairers' Association: Chairman, R. H. Green; Secretary, E. H. McGuire: Address, 1, Lloyd's Avenue, E.C. 3.

Royal Corps of Naval Constructors: Director of Naval Construction, A. W. Johns, C.B., C.B.E.; Deputy Director of Naval Construction, E. L. Attwood, O.B.E.; Director of Warship Production, C. E. Goodyear, O.B.E.; Assistant Directors of Naval Construction, F. Bryant, O.B.E., S. E. Boyland, O.B.E.. and A. W. Cluett, O.B.E.: Address, Department of Naval Construction, The Admiralty, Whitehall, London, S.W. 1.

Royal Merchant Seamen's Orphanage: President, H.R.H. The Prince of Wales, K.G.; Chairman, R. J. Lesslie; Deputy Chairman, J. Herbert Scrutton; Treasurer, The Earl of Inchcape, G.C.M.G., G.C.S.I., K.C.I.E.; Secretary, F. W. Rawlinson, C.B.E.: Address, Dixon House, Lloyd's Avenue, London, E.C.3.

Royal National Lifeboat Institution: President, H.R.H. The Prince of Wales, K.G.; Chairman, Sir Godfrey Baring, Bt.; Deputy Chairman, The Hon. George Colville; Secretary, G. F. Shee, M.A.; Telephone, Temple Bar 2161; Telegrams, "Lifeboat Institution, London": Address, 22, Charing Cross Road, London, W.C. 2.

Royal Naval Benevolent Society: President, Admiral of the Fleet, Sir William H. May, G.C.B., G.C.V.O.; Secretary, Paymaster Captain E. W. C. Thring, C.B., R.N.: Address, 18, Adam Street, Adelphi, London, W.C. 2.

Royal United Service Institution: President, Field-Marshal H.R.H. The Duke of Connaught and Strathearn, K.G., K.T., K.P., G.C.B., G.C.S.I., G.C.M.G., G.C.I.E., G.C.V.O., G.B.E., V.D.; Chairman of the Council, Field-Marshal Sir Claud W. Jacob, G.C.B., G.C.S.I., K.C.M.G.; Vice Chairman, Admiral of the Fleet Sir R. J. B. Keyes, G.C.B., K.C.V.O., C.M.G., D.S.O., M.V.O.; Secretary, Captain E. Altham, C.B., R.N.: Address, Whitehall, London, S.W. 1.

Sailing Ship Mutual Insurance Association, Ltd.: Chairman, A. Anderson; Secretary, J. F. Plincke: Address, 49, Leadenhall Street, London, E.C. 3.

Salvage Association, Inc.: Chairman, E. R. Pulbrook; Deputy Chairman, C. J. Sayer; Director and Secretary, Sir Joseph Lowrey, K.B.E.; Assistant Secretaries, F. C. Sadler and A. Muir Smith; Telegrams, "Wreckage, London"; Telephone, Monument 2051: Address, Lloyd's Building, London, E.C. 3.

Scottish Shipmasters' and Officers' Association: Now amalgamated with the Mercantile Marine Service Association Inc., *q.v.*

Seamen's Hospital Society: President, Captain H.R.H. The Duke of York, K.G., G.C.V.O., R.N.; Chairman, Capt. Sir A. W. Clarke, K.B.E.; Secretary, R. E. V. Bax; Asst. Secretary, C. E. H. Lloyd; Telephone, Greenwich 1881; Address, Seamen's Hospital, Greenwich, London, S.E. 10.

Seamen's National Insurance Society: Chairman of Management Committee, Sir Norman Hill, Bt.; Treasurer, R. V. Headland, O.B.E., Board of Trade Asst. Secretary for Finance; General Secretary, Sidney H. Godfrey: Address, 19, Leman Street, London, E. 1.

Shipbuilding Employers' Federation: President, J. H Edwards; Secretary, John S. Boyd; Deputy Secretary, A. Belch: Address, 9, Victoria Street, Westminster, London, S.W. 1.

Shipconstructors' and Shipwrights' Association: General Secretary, Wm. Westwood, O.B.E., J.P.; Telephone, Central 1886; Telegrams, "Shipwright, Newcastle": Registered Offices, 8, Eldon Square, Newcastle-on-Tyne.

Shipowners' Parliamentary Committee: Chairman, Rt. Hon. Walter Runciman, P.C., LL.D., M.P.; Vice-Chairman, Sir Norman Hill, Bt.; Secretary, H. M. Cleminson: Address, 28. St. Mary Axe, London, E.C. 3.

Shipowners' Protection and Indemnity Association, Ltd.: Chairman, Samuel West; Managers, John Holman and Sons: Address, 1, Lloyd's Avenue, London, E.C. 3.

Shipping Federation, Ltd., The: Chairman, F. C. Allen; General Manager, Cuthbert Laws; Secretary, Michael Brett; Assistant Secretary, Richard Snedden; Telephones, Monument 1636, 1637, and 1638; Telegrams, "Traffic, phone, London": Chief Office, 52, Leadenhall Street, London, E.C.3.

Soldiers', Sailors' and Airmen's Families Association: Chairman, Major-General the Hon. Sir Francis R. Bingham, K.C.B., K.C.M.G.; Vice-Chairman, The Duchess of Richmond and Gordon, C.B.E.; Telephone, Victoria 0396; Telegrams, "Gildea, Parl., London": Head Office, 23, Queen Anne's Gate, Westminster, London, S.W. 1.

South Coast Engineering and Shipbuilding Employers' Association: President, T. Donaldson; Secretary, William Nelson: Address, South-Western Chambers, Canute Road, Southampton.

Standard Ship Owners' Mutual Freight Dead Weight, Demurrage and Defence Association, Ltd.: Chairman, Sir Frederick Lewis, Bart.; Managers, Charles Taylor and Co.; Telephone, Monument 4021; Telegrams, "Adno, Fen, London": Address, 9, Fenchurch Avenue, London, E.C. 3.

Standard Steamship Owners' Mutual War Risks Association, Ltd.: Chairman, Sir Frederick Lewis, Bart.; Managers, Charles Taylor and Co.; Telephone, Monument 4021; Telegrams, "Adno, Fen, London": Address, 9, Fenchurch Avenue, London, E.C. 3.

Standard Steam Ship Owners' Protection and Indemnity Association, Ltd.: Chairman, Sir Frederick Lewis, Bart.; Managers, Charles Taylor & Co.; Telephone, Monument 4021; Telegrams, "Adno, Fen, London": Address, 9, Fenchurch Avenue, London, E.C. 3.

Steamship Mutual Underwriting Association, Ltd.: Chairman, W. A. Wilson; Secretary, J. F. Plincke: Address, 49, Leadenhall Street, London, E.C. 3.

Suez, Compagnie Universelle du Canal Maritime de: Chairman, Marquis de Vogüé; Chairman of London Committee and Vice-President, The Earl of Inchcape, G.C.S.I., G.C.M.G., K.C.I.E.; Secretary, Michel Homolle: London Address, 6, Bishopsgate, London, E.C.2.

Sunderland Shipowners' Society: President, Rt. Hon. The Earl of Durham; Chairman, Ernest F. Dix; Secretary, J. G. Rutherford: Address, 45 and 46, West Sunniside, Sunderland.

Sunderland Steamship Protecting and Indemnity Assn.: Chairman, F. Walford C. Common; Secretaries, John Rutherford & Son: Address, 45 and 46, West Sunniside, Sunderland.

Swansea Chamber of Commerce (Inc.): President, Fred A. Rees; Secretary, Henry J. Marshall; Telephone, 2818; Telegrams, "Commerce, Swansea": Address, Chamber of Commerce, Swansea.

Tees District and Whitby Shipowners' Assn.: Chairman, Sir John Harrowing, J.P.: Address, Whitley; Honorary Secretary, B. O. Davies, J.P.: Address, Middlesbrough.

Thames Estuary and Coasting Sailing Barge Mutual Insurance and Protection Association, Ltd.: Chairman, E. A. Hibbs; Secretary, J. F. Plincke: Address, 49, Leadenhall Street, London, E.C. 3.

Thames Nautical Training College: Chairman, The Rt. Hon. The Earl of Inchcape, G.C.S.I., G.C.M.G., K.C.I.E.; Captain Superintendent, Lt.-Commdr. G. C. Steele, V.C., R.N.; Head Master, C. E. Dall, B.Sc.; Secretary, F. H. Stafford: Address, 72, Mark Lane, London, E.C. 3.

Timber Trade Federation of the U.K.: President, E. P. Tetsall; Secretary, A. M. McVey; Telephone, Mansion House 5427: Address, Oxford Court, Cannon Street, E.C. 4.

Trade Facilities Act Advisory Committee: Telephone, Victoria 1234: Address, Treasury Chambers, Whitehall, London, S.W.1.

Trinity House, Corporation of: Master, Field-Marshal H.R.H. The Duke of Connaught, K.G.; Deputy-Master, Vice-Admiral Sir Robert Mansell, K.C.V.O., C.B.E.; Secretary, M. K. Smith, O.B.E.: Address, Tower Hill, London, E.C. 3.

Tyne Shipbuilders' Association: Secretary, James Cameron: Address, Bolbec Hall, Westgate Road, Newcastle-on-Tyne.

United Kingdom Mutual Steamship Assurance Association, Ltd.: Chairman, Sir Walter Runciman, Bt.; Managers, Thos. R. Miller & Son; Telephone, Avenue 1613; Telegrams, "Mutuality, Stock, London": Address, 24, St. Mary Axe, London, E.C. 3.

United States Shipping Board Merchant Fleet Corporation, European Division: Director for Europe, Captain P. C. Grening: London Address, Bush House, Aldwych, W. C. 2; Telephone, Temple Bar 1852–6.

Wear Shipbuilders' Association: Chairman, Major R. Norman Thompson; Secretary, George N. Cook: Address, Midland Bank Chambers, St. Thomas Street, Sunderland.

West of England Light Shipbuilders' Association: President, James Crichton; Secretary, J. A. S. Hassal: Address, 106, India Buildings, Liverpool.

West of England Mutual War Risks Association, Ltd.: Managers, John Holman and Sons: Address, 1, Lloyd's Avenue, London, E.C. 3.

West of England Steamship Owners' Protection and Indemnity Association, Ltd.: Chairman, Daniel Radcliffe; Deputy-Chairman, G. Dodd; Managers, John Holman & Sons: Address, 1, Lloyd's Avenue, London, E.C. 3.

COLONIAL AND FOREIGN SHIPPING ASSOCIATIONS.

AUSTRALIA.

Australasian Steamship Owners' Federation: Chairman, O. Y. Syme, Junr.; Secretary, H. M. Adams: Address, Steamship Buildings, 509, Collins Street, Melbourne.

Merchant Service Guild of Australasia: Secretary, W. G. Lawrence: Address, 79–81, Pitt Street, Sydney, N.S.W.

United Service Institution of New South Wales: Hon. Secretary, Lieut. Frederick Daniell: Address, 8, Young Street, Circular Quay, Sydney, N.S.W.

BELGIUM.

Antwerp Chamber of Commerce: Address, Local de la Bourse, Antwerp.

Antwerp Ship Repairers' Federation: Chairman, David Petrie; Secretary, Willy M. Speleers: Address, General Buildings, 14, Place de Meir, Antwerp.

Comité Maritime International: President, His Excellency Louis Franck, G.C.V.O.; Vice-Presidents, The Rt. Hon. Sir Leslie Scott, K.C., and M. Albert le Jeune; Hon. General Secretaries, Fred Sohr, George P. Langton, K.C., O.B.E., Leop. Dor, and Ant. Franck.

Fédération Maritime d'Anvers: Address, Courte rue des Claires 2, Antwerp.

Union des Armateurs Belges: President, Léon Dens, C.B.E.; Manager, A. de Bosschere: Address, 59, Meir, Antwerp.

CANADA.

American Association of Port Authorities: Address, 200, New Orleans Court Bldg., New Orleans, La.

Shipping Federation of Canada (Inc.): President, R. W. Reford: Address, 218, Board of Trade Building, Montreal.

CHINA.

China Coast Officers' Guild, The: Secretary, W. E. Kirby; Branch Secretary, Lieut.-Commdr. T. T. Laurenson, D.S.C., R.N.R.: Address, 17, The Bund, Shanghai.

DENMARK.

Assuranceforeningen Skuld. (Danish Branch): Address, Amaliegade 33, Copenhagen.

Baltic and International Maritime Conference: President, Mr. W. A. Souter, Newcastle-on-Tyne; Manager, Jacob Olsen: Address, 35, Amaliegade, Copenhagen, K.

Dansk Dampskibsrederiforening (Danish Steamship Owners' Association): President, A. O. Andersen; Managing Director, E. Maegaard: Address, Amaliegade 33, Copenhagen.

International Shipping Federation, Ltd. (Danish Branch): General Secretary, E. Maegaard: Address, Amaliegade 33, Copenhagen.

FRANCE.

Bureau des Longitudes (Publishers of the French Nautical Almanac): Address, Palais de l'Institut, 3, Rue Mazarine, Paris.

Bureau Veritas: President, C. J. Lefebvre; Managing Director, A. Berlhe de Berlhe: General Secretary, M. Charrnan: Address, 31, Rue Henri Rochefort, Paris (17e).

Comité Central des Armateurs de France: Chairman, G. Philippar; Vice-Président Délégué, M. Paul de Roussiers; Sécrétaire Général; M. J. Marchegay: General Assistant Secretary, J Marchegay: Address, 73, Boulevard Haussmann, Paris (8e).

Compagnie Universelle du Canal Maritime de Suez: Address, 1, rue d'Astorg, Paris (8e).

GERMANY.

Bremer Rhederverein: Address, Haus Schütting, Bremen.

Germanischer Lloyd: Managers, F. Buttermann and Prof. W. Laas: Address, Alsenstrasse 12, Berlin, N.W. 40.

Rhederverein für den Bezirk der Handelskammer zu Flensburg: Address, Heinrichstr 34, Flensburg.

Reedereiverein zu Lübeck: Address, Breitestrasse 6, Lübeck.

Rostocker Reeder-Verein: Erich Ahrens: Address, Postschliessfach 274, Rostock.

Schutzverein Deutscher Rheder (Freight, Demurrage and Defence Association): Chairman, H. M. Gehrckens, Senior; Manager, J. L. Bartelsen: Address, Alstertor 1, Hamburg 1.

Verband Deutscher Reeder, Inc.: President, Count von Roedern; General Manager, Dr. iur. Hans Rehmke: Address, Beim alten Rathaus, Patriotisches, Gebäude, VI Stock, Hamburg ii.

Verein Hamburger Rheder: Address, Mönckebergstrasse 27 II, Hamburg.

Verein Stettiner Rheder Address, Augustastr. 23, Stettin.

HOLLAND.

Bond van Werkgevers in de Koopvaardy (Mercantile Marine Employers' Association): Address, Rotterdam, Parklaan 8.

Centrale van Koopvaardy-officieren (Central Union of Merchant Marine Officers): Address, Eendrachtsweg 53, Rotterdam.

Nederlandsche Reedersvereeniging: President, J. Rypperda Wierdsma; Secretary, G. L. Heeris: Address, Stationsweg 135, The Hague.

Scheepvaart Vereeniging Noord (Shipping Association North): Address, Warmoesstraat. 197/199, Polmanshuis, Amsterdam, C.

Scheepvaart Vereeniging Zuid (Shipping Association South): Association of Employers in the Port-en-transporttrades.

INDIA.

United Service Institution of India: Address, Simla.

ITALY.

Federazione Fascista Armatori di Linea del Tirreno: President, On. Cav. Gr. Cr. Prof. D. Brunelli; General Secretary: Comm. Avv. V. Giulio Perosio: Address, Via XX Settembre 19/3– Genoa.

Federazione Fascista degli Armatori di Navi da Carico del Tirreno: President, Avv. G. B. Becchi; Secretary, Avv. Giuseppe Sciaccaluga: Address, Piazza Filippo Corridoni 6, Genoa (106).

Registro Italiano Navale Ed Aeronautico; Legal seat Rome, Piazza Dante; President Board of Administration: Amm. Giovanni Sechi-Director: Comm. Ing. Domenico Barricelli-Technical Office Genoa, via Petrarca 2: Regent of the Office; Comm. Ing. E. Mengoli, Secretary: Cav. Ing. E. Russo-Technical Office Trieste, via G. Rossini 2: Regent and Secretary: Cav. Ing. C. Doerfles.

JAPAN.

Nippon Shipowners' Association: President, K. Kagami; Managing Director, Z. Kamiya: Address, 32, Akashi Machi, Kobe.

Teikoku Kaiji Kyokai (Imperial Japanese Marine Corporation): Chairman, Baron Dr. C. Shiba; Secretary, S. Shinohara: Address, 1429–1433, Kaijo Building, Marunuochi, Tokio.

NORWAY.

Assuranceforeningen Skuld (Mutual) Shipowners' Protection and Indemnity: President: Otto Thoresen; Managing Directors, Sir Anton Poulsson, K.B.E., and Einar Poulsson; Address Carl Johansgate 1, Postbox 129, Oslo; Branch Office, Amaliegade 33, Copenhagen.

Det Norske Veritas: Chairman, Henrik Ameln; Managing Director, J. Bruhn, D.Sc.; Secretary, N. Hagness: Address, P.O. Box 82, Oslo.

Nordisk Skibsrederforening: President, Lauritz Kloster; Managing Director, J. Jantzen: Address, Drammensveien 21, Oslo.

Norges Rederforbund: President, H. M. Wrangell: Address, Stortingsgaten 16, Oslo.

Skibsbyggerienes Landsforening: Address, Chr. 4 gate 8-10, Oslo.

SPAIN.

"Almanaque Nautico" (The Spanish Nautical Almanac). *See* Observatorio de Marina.

Asociaciòn de Navieros de Bilbao: President, Sir Ramón de la Sota, K.B.E.; Secretary, Don Antonio Arroyo: Address, Ibañez de Bilbao 22, Bilbao.

Observatorio de Marina (Publishers of the Spanish "Almanaque Nautico"); Director, Señor Leon Herrero: Address, San Fernando, Cadiz.

SWEDEN.

Svenska Teknologföreningen adv. för Skeppsbyggnadskonst (Association of Swedish Engineers and Architects—Section for Naval Architecture): Address, Stockholm 16.

Sveriges Allmänna Sjöfartsförening (Swedish General Shipping Association): President, Hans Ericson; Secretary, Fritz von Schwerin: Address, Bragevagen, 10 Stockholm.

Sveriges Angfartygs Assurans Förening: Address, Gothenburg.

Sveriges Redareförening (Swedish Shipowners' Association): President, Gunnar Carlsson; Managing Director, O. A. Nordborg: Address, Kungsportsavenyen 1, Gothenburg.

UNITED STATES.

American Association of Port Authorities: President, Major General Wm. L. Sibert, Mobile, Ala.; Secretary, Tiley S. McChesney: Address, Room 200, New Orleans Court Building, New Orleans, Louisiana.

American Bureau of Shipping: President, C. A. McAllister; Secretary, J. W. Cantillion: Address, Stevenson Taylor Memorial Building, 24–26, Old Slip, New York.

American Manufacturers Export Association: F. R. Eldridge, Executive Vice-President: Address, 233, Broadway, New York City.

American Steamship Owners' Association: President, H. B. Walker; Secretary and Treasurer, R. J. Baker: Address, 11, Broadway, New York.

American Steamship Owners' Mutual Protection and Indemnity Association (Inc.): Chairman, Paul H. Harwood; Secretary, J. H. de G. Evans: Address, 104, Pearl Street, New York, N.Y.

Maritime Association of the Boston Chamber of Commerce: Chairman, Gerrit Fort; Manager, Frank S. Davis: Address, 80, Federal Street, Boston, Mass.

Master Boiler Makers' Association: Secretary, Albert F. Stiglmeier: Address, 29, Parkwood Street, Albany, New York.

National Association of Engine and Boat Manufacturers: Secretary, Ira Hand: Address, 420, Lexington Avenue, New York.

National Merchant Marine Association: President, Hon. Joseph E. Ransdell; Acting Secretary, Mr. Rene F. Clerc: Address, Munsey Building, Washington, D.C.

National Rivers and Harbours Congress: Secretary, S. A. Thompson: Address, 824, Colorado Building, Washington, D.C.

Nautical Almanac: Director of the American Ephemeris, Mr. James Robertson: Address, United States Naval Observatory, Washington, D.C.

Pacific American Steamship Association: President, J. C. Rohlfs; Secretary, J. P. Williams: Address, 256, Mission Street, San Francisco, California.

Port of New York Authority, The: Secretary, L. J. Keefe: Address, 80–90 Eighth Av., New York City.

Shipowners' Association of the Pacific Coast: President, F. J. O'Connor: Secretary, Nat Levin: Address, 256, Mission Street, San Francisco, California.

United States Shipping Board Merchant Fleet Corporation: Address, Washington D C.

THE SHIPPING SERVICES OF THE WORLD.

All lines run return journeys in reverse order to services given, except where otherwise stated.

***** Shipowners are requested to forward particulars of their Services for inclusion in this Section. No charge is made for insertion. Details should be addressed: The Editors, "Brassey's Naval and Shipping Annual," c/o Messrs. William Clowes and Sons, Ltd., 94, Jermyn Street, London, S.W.1.**

AFRICA, EAST.

British India Line; from London and Middlesbrough to Mombasa, Tanga, Zanzibar, Dar-es-Salaam, and Beira (*passengers and cargo*); from Bombay to Porebunder Marmagoa Seychelles, Mombasa, Zanzibar, Dar-es-Salaam, Mozambique, Beira, Delagoa Bay (*mails, passengers and cargo*).

Clan Line; Madagascar to United Kingdom.

Compagnie Havraise Péninsulaire de Navigation à Vapeur; from Dunkirk, Havre, Bordeaux, and Marseilles to Madagascar (East Coast), Réunion and Maurice Isle (*passengers and cargo*); from Dunkirk, Havre, Bordeaux, and Marseilles to Madagascar (West Coast) and Mozambique (*passengers and cargo*).

Deutsche Ost-Afrika Linie; from Hamburg, Rotterdam, Antwerp, and Southampton to Chief East African Ports (*passengers and cargo*).

Deutsche Ost-Afrika-Linie; from Hamburg, Rotterdam, Antwerp, and Southampton to Port Said and Suez (*passengers only*).

Ellerman and Bucknall Steamship Co., Ltd.; to Boston, New York, Philadelphia, and Baltimore (*regular cargo service*), *viâ* Suez Canal, from Canada (*regular cargo service*).

Furness, Withy and Co., Ltd.; see Prince Line.

German-African Lines; from Hamburg, Antwerp, and Southampton to Chief Ports of East Africa (*passengers and cargo*).

Hall Line: from Newport, Glasgow, and Liverpool to Port Sudan, Aden, Mombasa, Tanga, Zanzibar, Dar-es-Salaam, and ports of Madagascar and Portuguese East Africa, calling at Port Said (*cargo*); from Beira and other East African Ports to Marseilles, Avonmouth, Liverpool, Manchester, and Glasgow (*cargo*); from Aden to Marseilles and Liverpool (*cargo*); from Port Sudan to Marseilles, Avonmouth, and Liverpool (*cargo*).

Hamburg-Bremer Afrika-Linie G.m.b.H., in conjunction with Woermann-Linie, A.G., Deutsche Ost-Afrika-Linie and Hamburg-Amerika-Linie (Afrika-Dienst); from Hamburg, Antwerp, Lisbon, Genoa (*for passengers and cargo*); and from Southampton, Tangier, Malaga (*for mail and passengers only*) to Chief East African Ports.

Harrison Lines; from Glasgow and Birkenhead to Principal Ports of East Africa (*cargo*).

Henderson and Co., P.; from Glasgow and Liverpool to Port Said, Suez, and Port Sudan, *viâ* Marseilles.

Holland Africa Line; from Hamburg, Amsterdam, Antwerp (Combined Service) to all Principal Ports (*cargo and passengers, limited*).

Houston Lines; from Continent, Middlesbrough, London, Glasgow, Liverpool, and United States to Chief East African Ports (*cargo*).

Prince Line; from New York to Lourenço Marques, Beira, etc., *viâ* Cape (*cargo*).

Union-Castle Line; from London and Plymouth to Canary Islands, Capetown, Mossel Bay, Port Elizabeth, East London, Natal, Lourenço Marques and Beira (without transhipment); also for Knysna, Inhambane, Chinde, Quelimane, Macuse, Moma and Angoche (*passengers, mails and cargo*).

AFRICA, SOUTH.

Blue Funnel Line. *See* Holt and Co., Alfred, Liverpool.

British India Line; from Bombay to Durban (*passengers, mails, and cargo*).

Clan Line; from Newport, Glasgow, Liverpool to Capetown, Algoa Bay, East London, Natal, Lourenço Marques, Beira, Mauritius.

Deutsche Ost-Afrika Linie; from Hamburg, Rotterdam, Antwerp, and Southampton to Chief South African Ports (*passengers and cargo*).

Ellerman and Bucknall Steamship Co., Ltd.; from United Kingdom and Continent (*regular cargo and passenger services*); from Australia (*fortnightly cargo sailings*); from New York (*joint weekly cargo sailings*).

Furness, Withy and Co., Ltd. *See* Prince Line.

German-African Lines; from Hamburg, Rotterdam, and Southampton to South African Ports (*cargo and passengers*).

German-African Lines; from Hamburg, Antwerp and Southampton to Chief West African Ports (*passengers and cargo*).

Hall Line; from Newport, Glasgow, and Liverpool to Walvis Bay, Capetown, Mossel Bay, Algoa Bay, East London, Natal, Lourenço Marques, Beira, and Mauritius (*cargo*).

Hamburg-Bremer Afrika-Linie G.m.b.G., in conjunction with Woermann-Linie A.G., Deutsche Ost-Afrika-Linie and Hamburg Amerika-Linie (Afrika Dienst); from Hamburg, Bremen, Rotterdam, Antwerp (*for passengers and cargo*); and from Southampton (*for mails and passengers only*), to Chief South African Ports.

Harrison Line; from Newport, Birkenhead and Glasgow, and to Capetown, Mossel Bay, Algoa Bay, East London, Natal, Lourenço Marques, Beira, and Mauritius (*cargo*).

Harrison Line; London and Middlesbrough to Natal, Lourenço Marques, Beira, Capetown, Mossel Bay, Algoa Bay, and E. London.

Holland Africa Line; from Hamburg, Antwerp, Amsterdam, Rotterdam, to all Principal Ports (*cargo and passengers, limited*).

Holt and Co., Alfred, Liverpool; from Liverpool to Cape Town (*passengers*); homewards from Durban and Cape Town to Liverpool and Glasgow (*passengers and cargo*); from Cape Town to Australia (*passengers and cargo*); and Australia to Capetown (*passengers and cargo*).

Houlder Brothers and Co., Ltd.; from London to Cape Town, Port Elizabeth, East London, Natal, Lourenço Marques, and Beira (*passengers and cargo*).

Houston Lines; from United Kingdom and from United States (*both cargo services*).

Natal Line of Steamers, Bullard, King & Co., Ltd.; from London, Middlesbro' and Continent to South Africa; also service between Calcutta, Rangoon and Colombo and South and East African Ports (*passengers and cargo*).

Prince Line; from New York to Cape Town, Algoa Bay, East London, Port Natal (*cargo*).

Shaw, Savill and Albion Co., Ltd.; from London to Australia, *viâ* the Cape of Good Hope (outwards, *general cargo;* homewards, *a large amount of meat and dairy produce in cold storage*).

Union-Castle Line; Royal Mail Service from Southampton to Madeira, Capetown, Port Elizabeth, East London, and Natal (without transhipment); also for Lourenço Marques and Beira (*passengers, mails, and cargo*).

Union-Castle Line; from London and Plymouth to Canary Islands, Capteown, Mossel Bay, Port Elizabeth, East London, Natal, Lourenço Marques, and Beira (without transhipment); also for Knysna, Inhambane, Chinde, Quelimane, Macuse, Moma, and Angoche (*passengers, mails, and cargo*).

White Star-Aberdeen Line; from Liverpool to Cape Town (*passengers only*) to South Africa.

White Star Line; from Liverpool to Australia, calling at Cape Town (*passengers and cargo*).

Wilh. Wilhelmsen; from Norway, Sweden, Denmark, and Finland, to chief South African Ports (*cargo*).

AFRICA, WEST.

African Steam Ship Company; between Liverpool, London, Hull, Cardiff, Plymouth, Hamburg, Bremen, Amsterdam, Rotterdam, Antwerp, New York, Montreal and West and South-West African ports (*mails, passengers and cargo*).

British and African Steam Navigation Co., Ltd.; from Liverpool, London, Hull, Cardiff, Plymouth, Hamburg, Bremen, Amsterdam, Rotterdam, Antwerp, New York, Montreal, and West and South-West African Ports (*passengers and cargo*).

Deutsche Ost-Afrika Linie; from Hamburg, Rotterdam, Antwerp, and Southampton to Las Palmas (*passengers and cargo*).

Elder Dempster and Co., Ltd.; between Liverpool, London, Hull, Cardiff, Plymouth, Hamburg, Bremen, Amsterdam, Rotterdam, Antwerp, New York, Montreal and West and South-West African ports (*mails, passengers and cargo*).

Hamburg-Bremer Afrika-Linie G.m.b.H. in conjunction with Woermann-Linie A.G., Deutsche Ost-Afrika-Linie and Hamburg-Amerika-Linie (Afrika-Dienst); from Hamburg, Bremen, Rotterdam, Antwerp, Le Havre (*for passengers and cargo*); and from Boulogne s/M, Southampton (*for mail and passengers only*) to Chief West African Ports.

Holland West Africa Line; from Hamburg, Bremen, Amsterdam, Rotterdam, Antwerp, Bordeaux, with Trans to all Principal Ports (*cargo and passengers*).

Houston Lines; from London, Glasgow, and Liverpool (*cargo*).

Union-Castle Line; from London and Lobito Bay, Walvis Bay, and Luderitz Bay; Capetown, Port Elizabeth, East London and Natal to Mauritius.

Woermann-Linie A.G.; from Hamburg, Rotterdam, Antwerp, Boulogne, and Southampton to West African Ports (6 lines, *passengers and cargo*).

Woermann-Linie A.G.; from Hamburg, Rotterdam, Antwerp, Boulogne, Southampton to Madeira and Canary Islands (*passengers and cargo*).

AMERICA, CENTRAL AND WEST INDIES.

Canadian National Steamships; Montreal, to Hamilton (Ber.), Nassau (Ba.), Kingston (Ja.), and Belize (B.H.) (*passenger, mail and cargo*); during the winter this service operates from Halifax, N.S.; from Montreal and Halifax to Hamilton (Ba.), St. Kitts, Nevis, Antigua, Montserrat, Dominica, St. Lucia, Barbados, St. Vincent, Grenada, Trinidad and British Guiana (*passenger, mail and cargo*; *passengers and mail only* from Halifax; all these steamers operate from Halifax only in winter).

Compagnie Générale Transatlantique; Havre, St. Nazaire, Bordeaux and Plymouth to Central American Ports (*cargo*).

Cuban Line (Ernest Bigland and Co., Ltd., Managers); from Antwerp, Hull, and London to Cuba and Mexico (*cargo and few passengers*).

Elders and Fyffes, Ltd.; from Avonmouth, Garston, and Rotterdam to Jamaica, Barbados, Trinidad, Port Limon (Costa Rica), Cristobal (Canal Zone), Spanish Honduras, and Santa Marta (Colombia) (*passengers only*).

Ellerman and Bucknall Steamship Co., Ltd.: Calcutta, and Rangoon to West Indies and Cuba (*regular joint service*).

Furness-Bermuda Line; from New York to Bermuda (*passengers and cargo*); from New York to West Indies (*passengers and cargo*).

Furness Line; from London, Liverpool, Glasgow, and Manchester to Colon and Balboa, proceeding thence to Los Angeles, San Francisco, Victoria and Vancouver (*fast passenger and cargo*).

Furness, Withy and Co., Ltd. *See* Furness Line, Furness-Bermuda Line, and Trinidad Line.

Hamburg American Line; from Hamburg, Southampton, and Plymouth (*passengers only*) to Trinidad and Central America (*passengers and cargo*); from Hamburg to Cuba (*freight*); from Hamburg to West Coast Ports and Mexico, *viâ* Panama (*passengers and cargo*); from Hamburg to the West Indies Islands (three-weekly).

Harrison Line; from Glasgow to West Indies and Demerara (*cargo*); from London to West Indies and Demerara (*passengers and cargo*); from Swansea, Glasgow, and Liverpool to North Pacific Ports, *viâ* Panama Canal (*cargo*); from Liverpool, to British West Indies, Venezuela, Dutch West Indies, Colombia, and Cristobal, (C.Z.) (*cargo*); from Glasgow and Liverpool to Bermudas, Bahamas, Kingston (Jam.) and Mexico (*cargo*); from Liverpool to Jamaica, Spanish Honduras, Guatemala and British Honduras (*cargo*).

Holland America Line; from Rotterdam, Antwerp, Boulogne-sur-Mer to Havana, Vera Cruz, Tampico, and New Orleans, *viâ* Bilbao, la Coruna and Vigo.

Holt and Co., Alfred, Liverpool; Boston and New York to and from the Straits Settlements, Philippines, China, Japan, Korea, Siberia, and Suez *viâ* Panama (*cargo*).

Houston Lines; from River Plate Ports to United States and Canada, calling at Cuba (*cargo service*).

Jamaica Direct Fruit Line; Regular fortnightly Service from London to Kingston (*passengers and cargo*).

Kaye, Son and Co., Ltd., U.K. Agents, Jamaica Direct Fruit Line, Ltd.

Koninklijke Nederlandsche Stoomboot Mij. N.V.; from Hamburg, Antwerp, Rotterdam-Amsterdam to all Principal Ports in West India, Central America, and West Coast of South America (*passengers and cargo*).

Larrinaga Line; from Houston and Galveston to Liverpool and Manchester, and to Bremen from Liverpool to Cuba, etc.

Leyland Line; from Liverpool, London, and Manchester to Panama and Costa Rica (*passengers and cargo*).

New York and Porto Rico Steamship Co. *See* Porto Rico Line.

New Zealand Shipping Co., Ltd.; from London and Liverpool *viâ* Curacoa and the Panama Canal to New Zealand and Australia (*passengers and cargo*).

Nourse Line; from Calcutta and Rangoon to West Indies and Cuba.

Panama Rail Road Steamship Co.; from New York and Port au Prince (Hayti), to Cristobal (Canal Zone, Panama) (*passengers and cargo*).

Porto Rico Line; from New York to San Juan, Ponce, Mayaguez, Arroyo, Aguadilla, Arecibo, etc. (*freight and passengers*); from New Orleans and Mobile to San Juan, Ponce, and Mayaguez, Arroyo, Aguadilla, Arecibo, etc. (*freight*).

Roland-Linie Aktien-Gesellschaft; from Hamburg, Bremen and Antwerp to West Indies and Central America.

Royal Mail Steam Packet Co.; from London and Hull to Bermuda, Nassau, Jamaica, and Haiti (*cargo only*); also from London to Jamaica direct (*passengers and cargo*); from Rotterdam, Antwerp, and London to Curaçao, Puerto Colombia, Cartagena, Cristobal, and Central American Pacific Ports (*passengers and cargo*); from Cristobal and Central American Pacific Ports to Liverpool, Southampton, London, Hamburg, Bremen, Rotterdam, Antwerp (*passengers and cargo*).

Shaw, Savill and Albion Co., Ltd.; from London through the Panama Canal to New Zealand, returning by same route (*passengers and cargo*).

Trinidad Line from New York to Grenada, Trinidad, and Demerara (*passengers and cargo*).

Wilh. Wilhelmsen; from Norway, Sweden, Denmark, and Finland to Cuba, Vera Cruz, and Tampico (*cargo and a few passengers*).

White Star Line, jointly with Shaw, Savill and Albion Co., Ltd.; from London to New Zealand *viâ* Panama Canal (*cargo*) (*passengers from* Southampton).

AMERICA, SOUTH.

Booker Line; from Liverpool to Demerara (British Guiana) direct (*passengers and cargo*).

Booth Line; from Antwerp, Hamburg, Havre, Liverpool, Lisbon, London, Madeira and Oporto to principal North Brazilian Ports, and Iquitos, Peru; also from New York to all principal Brazilian Ports (*passengers and cargo*).

British and Argentine Steam Navigation Co., Ltd.; from Liverpool and London to River Plate Ports (*passengers and cargo*).

Canadian National Steamships, from Montreal (during the winter months this service operates from Halifax, N.S.).

Compagnie Générale Transatlantique; Antwerp, Dunkirk, Havre, and Bordeaux to Pacific Coast Ports (*cargo*).

Donaldson South American Line; from Glasgow and Liverpool to Monte Video and Buenos Aires—also by transhipment to other River Plate Ports (*refrigerated cargo*).

Furness-Houlder Argentine Lines; from London and Liverpool to Argentine and Uruguay; from London to River Plate; from Newport, Mon., and Swansea to River Plate (*refrigerated cargo and a few first-class passengers*).

Furness-Prince Line; from New York to Rio de Janeiro, Santos, Montevideo, and Buenos Aires (*express passenger and cargo*).

Furness, Withy and Co., Ltd. *See* Furness-Houlder Argentine Lines; Furness-Prince Line, and Prince Line.

Hall Line; from Calcutta to River Plate Ports (*cargo*); from River Plate to Dunkirk and Antwerp.

Hamburg-American Line; from Hamburg to Brazil and La Plata Ports (*passengers and cargo*); from Hamburg to West Coast Ports of South America (*viâ* Magellan, fortnightly; *viâ* Panama, every ten days).

Hamburg-Südamerikanische Dampfschifffahrts-Gesellschaft; from Hamburg to Brazil, Uruguay, and Argentina (*passengers, cargoes and mails*).

Harrison Line; Liverpool and South Wales to Brazil (*cargo*).

Henderson and Co., P.; from Glasgow to principal South American Ports (*cargo*).

Holland and Co., Ltd., Arthur; sailings from Bristol Channel Ports to Principal South American Ports (*cargo*).

Houlder Brothers and Co., Ltd.; from Antwerp, London, Liverpool, and Bristol Channel to Monte Video, Buenos Aires, and Rosario (Outwards, *general cargo and passengers;* Homewards, *frozen meat, chilled meat, dairy produce, and general cargo; and passengers*).

Houston Lines; from United States to River Plate; from Canada to River Plate; from West Indies to River Plate (*all cargo services, carrying a few passengers*).

Kaye, Son and Co., Ltd.; monthly service with new oil and coal burning steamers from Glasgow and Liverpool to Monte Video, Buenos Ayres, and Villa Constitucion; vessels specially fitted with derricks to lift 30 tons, with 45 feet radius.

Koninklyke Hollandsche Lloyd, N.V.; from Amsterdam to Buenos Aires, calling en route at Southampton, Cherbourg, La Corunna, Vigo, Leixoes, Lisbon, Las Palmas, Pernambuco, Bahia, Rio de Janeiro, Santos, and Monte Video (*passengers and mails*, taking cargo at Amsterdam for Rio de Janeiro, Santos, and Buenos Aires); from Hamburg and Amsterdam to the River Plate (Monte Video and Buenos Aires) (*cargo*); from Hamburg, Amsterdam, Antwerp and Portuguese Ports to Brazil (Pernambuco, Bahia, Rio de Janeiro, and Santos) (*cargo*); from Hamburg and Amsterdam to South Brazil, Rio Grande do Sul, Pelotas, and Porto Alegre) (*cargo*).

Lamport and Holt; from Glasgow and Liverpool to Brazil direct; from Glasgow and Liverpool to River Plate direct; from Liverpool to Brazil, *viâ* Portugal; from Liverpool to River Plate, *viâ* Spain; from Liverpool to Brazil and River Plate, *viâ* Spain and Portugal; from Antwerp, Middlesbrough, and London to the River Plate; between New York and North Brazil.

MacIver Line; from Liverpool to principal River Plate Ports without transhipment (*cargo*).

Nautilus Steam Shipping Co., Ltd., Ritson, F. and W.; from Glasgow, Liverpool, and London to principal West Coast South American Ports (*cargo*).

Nelson, Ltd., H. and W.; from London to Buenos Aires, calling on the outward journey at Boulogne, Vigo, Lisbon, Las Palmas, G.C., Rio de Janeiro, Santos, and Monte Video, and vice versa (*cargo, passengers, and mails*)

New Orleans and South American S.S. Co., Inc. *See* Nosa Line.

Nippon Yusen Kaisha; from Hong Kong, Moji, Kobe, Yokkaichi, Yokohama, Honolulu, and Hilo to San Francisco, Los Angeles, Manzanillo, La Libertad, Balboa, Buenaventura, Callao, Pisco, Mollendo, Arica, Iquique, and Valparaiso (*passengers, mails, and cargo*).

Nosa Line (New Orleans and South American S.S. Co., Inc.); from New Orleans to Ports of Colombia, Ecuador, Peru, Chile (*cargo and mails*).

Prince Line; from Boston, Philadelphia, and New York to Montevideo and Buenos Aires; from New York to Rio de Janeiro, Santos and River Plate (*fast freight services*),

Roland-Linie Aktien-Gesellschaft; from Bremen, Hamburg, Rotterdam, Antwerp to and *viâ* Panama Canal, Columbia (Pacific Ports), Equador, Peru, and Chile (*passengers and cargo*).

Roland-Linie Aktien-Gesellschaft; from Antwerp, Rotterdam, Bremen, and Hamburg, *viâ* Str. of Magellan to Chile.

Rotterdam South America Line; Koninklijke Hollandsche Lloyd (joint service); from Hamburg, Antwerp, Amsterdam, Rotterdam to all Principal Ports in South America (*cargo "A" boats passengers*).

Rotterdam-Zuid Amerika Lijn; from Hamburg, Rotterdam, and Antwerp to Buenos Aires, Monte Video, Santos, Rio de Janeiro, and Santa Fé (*mail and cargo, carrying twelve passengers*).

Royal Mail Steam Packet Co.; from Southampton to Pernambuco, Bahia, Rio de Janeiro, Santos, Monte Video, and Buenos Aires (*mails, passengers, and cargo*); from Liverpool to Rio de Janeiro, Santos, Montevideo, and Buenos Aires, calling at Cherbourg, Corunna, Villagarcia, Vigo, Leixoes, and Lisbon (*mails, passengers and cargo*); from London, Cardiff, Newport, and Swansea to Pernambuco, Maceio, Bahia, Rio de Janeiro, Santos, Rio Grande do Sul, Porto Alegre, and Paranagua (*cargo only*); from Brazil to Havre, Antwerp, Rotterdam, Bremen, Hamburg, London, and Liverpool.

Shaw, Savill and Albion Co., Ltd.; from London to New Zealand, proceeding on the outward journey *viâ* the Panama Canal, and on the homeward journey *viâ* Cape Horn, calling at Monte Video and Teneriffe (*cargo, and meat and dairy produce in cold storage on homeward voyage*).

Sota y Aznar; calling at every port between Pesages and Barcelona, both included, from Hamburg, Rotterdam, Antwerp, Bilbao, and Gijan to River Plate ports (*cargo*) and reverse.

Sota y Aznar; from Hamburg, Rotterdam, Antwerp, Bilbao, and Gijon to River Plate Ports (*cargo*) and reverse.

Wilh. Wilhelmsen (Wilhelmsen Steamship Line); from New York to Brazil and River Plate Ports (*cargo and refrigerated stores—fortnightly*).

AUSTRALIA AND NEW ZEALAND.

Aberdeen and Commonwealth Line; from London (Southampton, *passengers only*) to Fremantle, Adelaide, Melbourne, Sydney, and Brisbane, *viâ* Port Said and Colombo (*passengers and cargo*); from United Kingdom Ports to Fremantle, Adelaide, Melbourne, Sydney, Brisbane, Townsville, and Cairns, *viâ* Suez Canal (*cargo*).

Adelaide Steamship Co., Ltd., The; between Queensland Ports, Sydney, Newcastle, Melbourne, Adelaide, Albany, and Fremantle (*passengers, cargo and stock*); between Port Adelaide, Spencer's Gulf, and West Coast Ports (*passengers, cargo, and stock*).

Anderson, Green and Co., Ltd. *See* Orient Line.

Australian Steamships Pty., Ltd.; Regular Services (*passenger and cargo*) between Melbourne, Sydney, Newcastle, Brisbane, Queensland Ports, Adelaide, and other South Australian Ports; Albany, Fremantle, Geraldton, and W.A. Ports; Geelong, Portarlington, Warrnambool, Portland, Port Fairy, Beachport, Kingston, etc.

Bethell, Gwyn & Co., 22, Billiter Street, London, E.C. 4, and 11, Baldwin Street, Bristol, Joint Managers for West Australian Steam Navigation Co., Ltd., maintaining service from Singapore to Fremantle *viâ* North-West Australian ports and vice versa; Joint Managers for Australind S.S. Co., Ltd.

Bethell, Gwyn & Co. also load steamers for Suva, Fiji (*direct*) at regular intervals from London, and act as loading brokers for steamers from Bristol Channel ports to Australia, New Zealand, etc.

Blue Funnel Line. *See* Holt and Co., Alfred.

British India Line; from London to Queensland ports; from Bristol Channel ports, Manchester, and Liverpool to Adelaide Melbourne, Sydney, and Brisbane; from Calcutta to Australian Ports (*passengers and cargo*).

Burns, Philp and Co., Ltd.; between Sydney, Queensland Ports, Darwin, Java, and Singapore; between Sydney, Lord Howe Island, Norfolk Island, and New Hebrides; between Sydney, Brisbane, Solomon Islands, and New Britain; between Sydney, Queensland, Papua, and Rabaul; between Sydney and New Britain direct (*mails, passengers, and cargo*).

Canadian-Australian Line. *See* Canadian Pacific Railway Co.

Canadian National Steamships; from Montreal (*cargo*). During the winter months this service operates from Halifax, N.S.

Canadian Pacific Railway Co., in conjunction with the Canadian-Australian Line; from Vancouver to Honolulu, Suva, Fiji, Auckland, N.Z., and Sydney, Australia (*passengers and cargo*).

Clan Line; Australia and Tasmania to U.K./Continent.

Commonwealth and Dominion Line, Ltd.; from London, also Glasgow and Liverpool, to Auckland, Wellington, Lyttleton and Port Chalmers and/or Dunedin, N.Z., *viâ* the Panama Canal.

Commonwealth and Dominion Line; from London, Middlesbrough, Hull, Antwerp and Hamburg to Melbourne, Sydney, Newcastle, N.S.W., Brisbane, Hobart and Launceston *viâ* the Suez Canal.

Commonwealth and Dominion Line; from New York to Australia and New Zealand *viâ* the Panama Canal; Homewards from Australia and New Zealand to United Kingdom and Continent (*cargo and passengers*).

Cunard Line; from Southampton, Liverpool, Belfast, Glasgow, Queenstown, Cherbourg, Havre *viâ* U.S.A. or Canada to all the chief Ports of Australia and New Zealand (*passengers*).

Eastern and Australian Steamship Co., Ltd.; Melbourne, Sydney, Brisbane and Queensland Ports to Borneo, Manila, Hongkong and Japanese Ports (*passengers and cargo*).

Ellerman and Bucknall Steamship Co., Ltd.; to London, United Kingdom and Continent, also United States (*regular cargo services*); from New York (*frequent* (*joint cargo services*).

Federal Steam Navigation Co., Ltd.; from London and West Coast Ports of Great Britain to Principal Ports of Australia and New Zealand (*passengers and cargo*).

Henderson and Co., P.; from Glasgow and Liverpool to principal Australian Ports (*cargo*).

Holt and Co., Alfred; Glasgow and Liverpool, and Hamburg, Bremen, Rotterdam and Antwerp to and from Western Australia, Adelaide, Melbourne, Sydney and Brisbane; Singapore to and from West Australian Ports (*passengers and cargo*).

Leeds Shipping Co., Ltd. *See* Smith and Sons, Ltd., Sir Wm. Reardon.

Liverpool Line to Australia; from Liverpool to Fremantle, Adelaide, Melbourne, Sydney, Newcastle, Brisbane, Auckland, Wellington, Lyttelton and Dunedin; from Manchester to same ports (*passengers, cargo, and live stock*). Marwood and Robertson, 33, Brazennose Street, Manchester, and 18, Water Street, Liverpool.

McIlwraith, McEacharn, Lim.; from Sydney to Melbourne, Adelaide, Albany, and Fremantle (*passengers and cargo*).

New Zealand Shipping Co., Ltd., from London and West Coast ports of Great Britain, *viâ* the Panama Canal, to principal Australian and New Zealand Ports (*mails, passengers, and cargo*).

Oakwin Steamship Co., Ltd. *See* Smith and Sons, Ltd., Sir Wm. Reardon.

Orient Line to Australia; from Tilbury to Fremantle, Adelaide, Melbourne, Sydney, and Brisbane, calling at Gibraltar, Toulon, Naples, Port Said, and Colombo, also on the return journey at Plymouth. At certain seasons of the year the vessels call at Hobart, Tasmania (*passengers, cargo, and mails for Commonwealth of Australia*).

Peninsular and Oriental Branch Line to Australia; from London to Fremantle, Adelaide, Melbourne, and Sydney, *viâ* Suez Canal and Colombo (*passengers—one class only—mails and cargo*).

Peninsular and Oriental Steam Navigation Company; fortnightly service from London and Marseilles to Fremantle, Adelaide, Melbourne, Sydney, and Brisbane, calling at Gibraltar, Marseilles, Port Said, Port Sudan (alternative voyages), Aden, and Colombo, and homewards also at Plymouth (*passengers, mails, and cargo*).

Shaw, Savill and Albion Co.; from Glasgow and Liverpool to Port Chalmers *viâ* Panama Canal, calling at Auckland, Wellington, and Lyttleton (*mails and cargo*); from London to New Zealand, proceeding *viâ* the Panama Canal, and on the return journey *viâ* Cape Horn, calling at Monte Video and Teneriffe en route (*cargo*).

Trinder, Anderson and Co.; from London to principal Australian Ports (*cargo*).

Turnbull, Martin and Co., Ltd.; from London and West Coast Ports of Great Britain to principal Australian and New Zealand Ports (*passengers and cargo*).

White Star-Aberdeen Line; from Liverpool to Albany, Adelaide, Melbourne, Sydney, and Brisbane; calling at Teneriffe and Cape Town (outward), and Fremantle, Durban, Cape Town, Teneriffe, Southampton, London, and Liverpool. (homeward) (*passengers and cargo*).

White Star Line; Liverpool to Sydney calling at Cape Town, Albany, Adelaide, Melbourne (*passengers and cargo*). White Star Line jointly with the Aberdeen and Commonwealth Line; London to Brisbane, *viâ* Suez Canal, calling at Colombo, Fremantle, Adelaide, Melbourne, and Sydney (*passengers and cargo*), jointly with the Shaw Savill and Albion Co., Ltd., from London to Port Chalmers, *viâ* Suez Canal, calling at Auckland, Wellington, and Lyttleton (*passengers, mail. and cargo*).

Wilh. Wilhelmsen: from Norway, Sweden, Denmark, Finland, Hamburg, and Antwerp to principal Australian Ports (*cargo*).

BALTIC AND NORTH SEA.

American-Hawaiian Steamship Co.; from Los Angeles, Portland, San Francisco, Seattle, and Tacoma to Hamburg, calling at Glasgow, Havre, Liverpool, and London (*fortnightly cargo sailings*).

Bachke and Co.; from Trondhjem and West Norwegian Ports to Aberdeen, Grangemouth, Hull, Grimsby, London, Manchester, Bristol, Swansea, Bremen, Antwerp and French Ports (*cargo*).

Bergenske Dampskibselsskab, Det.; from Glasgow, Manchester, Middlesbrough and Newcastle to Principal Ports of Norway and Sweden (*passengers and cargo*).

Bergenske Steamship Company (Bergenske Dampskibsselskab, Det); from Newcastle-on-Tyne to Bergen, and *vice versâ*, three times weekly; quickest route England-Scandinavia (*passenger and cargo*); Cargo steamers from London, Middlesbrough, Manchester, Preston, Glasgow to West Coast of Norway and *vice versâ;* regular weekly passenger and cargo steamers Hamburg-Bergen, Rotterdam-Bergen, Faroe Islands, and Iceland-Bergen, and *vice versâ;* cargo steamers from Hamburg, Rotterdam, Amsterdam, Antwerp, French Atlantic ports, Stettin, Danzig, Malmö, and Gothenburg to West Coast of Norway, and *vice versâ.*

Brodin, Erik; from London to Principal Ports of Norway and Sweden (*passengers and cargo*).

Cook and Son, Ltd., John; East Norway to Aberdeen, Dundee and Granton (*cargo*)

Cormack Steamship Co., Ltd., The; between Aberdeen, Dundee, Grangemouth, Leith, Montrose, Burntisland, Methil, and Riga, Windau and other Latvian Ports (*cargo and few passengers*).

Compagnie Générale Transatlantique: Havre to Memel and Danzig (*passengers and cargo*).

Currie Line. *See* The Leith, Hull and Hamburg Steam Packet Co., Ltd.

Ellerman's Wilson Line; from Hull, London, Liverpool, Manchester, Newcastle, and Swansea to Norway, Sweden, Denmark, Poland, and Baltic States (*passengers and cargo*).

Finland Line; Finland Steamship Co., Ltd. *See* Finska Ångfartygs Aktiebolaget.

Finska Ångfartygs Aktiebolaget; from Hull to Helsingfors and Hangö every Wed. *viâ* Kiel Canal (*passengers and cargo*): from Copenhagen to Helsingfors (*passengers and cargo*); from Antwerp to Finnish Ports (*passengers and cargo*); from Stettin and Lübeck to Helsingfors and Finnish Ports (*passengers and cargo*): from Stockholm to Helsingfors and Abo (*passengers and cargo*); from Danzig, Riga and Reval to Helsingfors or Hangö (*passengers and cargo*). The foregoing lines carry mails for Germany, Sweden, and Esthonia. From Hull, London, Liverpool, and Manchester, Leith, Grangemouth to Finnish Ports (*cargo*); from Rotterdam, Antwerp, and Northern France to Finnish (Ports (*cargo*). From Marseilles, Geneva and Spanish Ports to Finnish Ports (*cargo*).

Forenede Dampskibs-Selskab, Det.; from Hull, London, Manchester, Swansea Liverpool, Newcastle, Leith, Grimsby and Harwich to Ports of Scandinavia (*passengers and cargo*).

Glen and Co.; from Glasgow to Gothenburg (*cargo*).

Head Line and Lord Line; to Belfast and Dublin, from Petrograd, Reval, Pernau, and Riga (*chiefly cargo*); between Belfast, Dublin, Cork, Londonderry and Hamburg, Amsterdam, Antwerp, Rotterdam and Ghent and Bremen (*chiefly cargo*).

Leith Hull and Hamburg Steam Packet Co., Ltd., The; from Leith to Hamburg (*passengers and cargo*); from Glasgow, Grangemouth, Dundee, Liverpool and Manchester to Hamburg (*cargo*); from Middlesbro' to Hamburg (*cargo*); from Leith to Bremen (*cargo*); from Leith to Copenhagen (*passengers and cargo*). James Currie & Co., Leith, Managers.

Lord Line. *See* Head Line and Lord Line.

Oakwin Steamship Co., Ltd. *See* Smith and Sons, Ltd., Sir Wm. Reardon.

Roland-Linie Aktien-Gesellschaft; from Bremen, Antwerp, and Rotterdam to Finland, Russia, Esthonia, Latvia, Lithuania, German Baltic Ports, and Denmark.

Salvesen and Co., Chr.; from Leith to Gothenburg (*cargo*); from Grangemouth to Nidaros (Trondhjem), calling at Stavanger, Bergen, Aalesund, and Christiansund N. (*cargo*); from Oslo, Drammen, Skien, Risoer, and Christiansund S. to Aberdeen, Dundee, and Granton (*cargo*); from Finland to Leith (*cargo*).

Salvesen and Co., J. T.; from Grangemouth to Stockholm and principal Baltic Ports during the season (*cargo*).

Stott Line, Ltd. (W. H. Stott and Co., Ltd., Managers); Liverpool, and Manchester to Norway, Sweden, Denmark, Danzig, Esthonia, Latvia, and Russia.

CANADA.

Anchor-Donaldson Line; *Summer service:* Glasgow, Belfast and Liverpool to Quebec and Montreal (*passengers and cargo*). *Note.*—On return voyages the vessels do not call at Liverpool. *Winter service:* Glasgow to St. John, N.B. and Halifax, N.S. (*passengers and cargo*).

Bermuda and West Indies Steamship Company Ltd., The; between Montreal, Province of Quebec, Charlottetown, Prince Edward Island, and St. John's, Newfoundland (*passengers and cargo*).

Cairns, Noble and Co., Ltd.; from Calais, Hamburg, Hull, Middlesbro', Leith, and Dundee to Montreal and Portland, Maine (*cargo*); from Mediterranean Fruit Ports to St. John, N.B., and Montreal.

Cairn-Thomson Line; from Leith and Newcastle to Montreal (*cargo*) (Summer).

Canada Steamship Lines, Ltd.; from Port Arthur to Chicoutimi, calling at Duluth, Fort William, Sault Ste, Marie, Sarnia, Detroit, Windsor, Port Colborne, Hamilton, Toronto, Rochester, Kingston, Alexandria Bay, Clayton, Brockville, Prescott, Cornwall, Montreal, Sorel, Quebec, Murray Bay, and Tadousac (*passengers and cargo*).

Canadian National Steamships between Vancouver, Victoria, Montreal, and Quebec in summer, Halifax in winter, intercoastal

Canadian Pacific Steamships, Ltd. (*passengers, freight, and mails*); from Liverpool, Glasgow, Belfast, Southampton, Antwerp, Cherbourg, Hamburg and Cobh (Queenstown) to Quebec and Montreal in summer, and to Saint John, New Brunswick, in winter; from London and Havre to Montreal in summer, and Saint John New Brunswick, in winter.

Compagnie Général Transatlantique; Antwerp, Dunkirk, Havre, and Bordeaux to Atlantic and Pacific Coast Ports (*passengers and cargo*).

Cunard Line; from Southampton, Liverpool, London, Belfast, Glasgow, and Cherbourg to Quebec and Montreal (*passengers and cargo*); Southampton, Liverpool, London, Queenstown (*passengers only*), Belfast, Glasgow, Cherbourg, to Halifax N.S. (*passengers and cargo*).

Dominion Line; from Avonmouth to Montreal (summer).

Donaldson Brothers, Ltd. *See* Anchor-Donaldson Line.

Furness Line; from London to Montreal (*cargo*); from London to St. John N.B. and Halifax N.S. (*cargo*); from Liverpool, Glasgow, and Manchester to Pacific Coast Ports (*fast passenger and cargo*).

Furness-Red Cross Line; from New York to Halifax, N.S., and St. John's N.F. (*passenger and cargo*); from Montreal to St. John's, N.F. (*passenger and cargo*).

Furness, Withy and Co., Ltd. *See* Cairn-Thomson Line; Furness Line; Furness-Red Cross Line; Manchester Liners, and Warren Line.

Head Line and Lord Line; to Belfast, Cork, Dublin, Hamburg, Londonderry and Rotterdam from Baltimore, Galveston, Montreal, New Orleans, Quebec and St. John, N.B. (*chiefly cargo*).

Holland America Line; from Rotterdam, Antwerp, Swansea or London to Vancouver and other North Pacific Ports.

Holland America Line; from Rotterdam, Boulogne, Southampton, Halifax, N.S.

Houston Lines; from River Plate; from India and Far East (*both cargo services*).

Inter-Continental Transport Services, Ltd. ("County Line"); from Montreal, Que. (summer), St. John, N.B. (winter) to Havre, Antwerp, Bordeaux, Rotterdam and Hamburg (*cargo only*).

Lord Line. *See* Head Line and Lord Line.

Manchester Liners; Manchester to Quebec and Montreal, St. John (N.B.), Philadelphia, Baltimore, Norfolk (Va.), and Newport News; St. Lawrence, weekly, and Philadelphia service, under normal conditions, fortnightly.

Royal Mail Steam Packet Co.; from Rotterdam, Antwerp, London, and Swansea to Vancouver and Victoria, *viâ* Panama Canal (*passengers, mails, and cargo*); from Vancouver and Victoria to Liverpool, Southampton, London, Rotterdam, Hamburg, Bremen, and Antwerp.

Warren Line; from Liverpool to St. John's, N.F., Halifax, N.S. (*fast passenger and cargo*).

White Star Line; from Liverpool to Quebec and Montreal (*passengers and cargo*); from Belfast and Glasgow to Quebec and Montreal (*passengers*); London to Quebec and Montreal (*cargo*); Havre, Southampton, and Queenstown or Galway to Quebec and Montreal (*passengers*). *Note.*—Between November and April these services are to Halifax, N.S., instead of Quebec and Montreal.

NEWFOUNDLAND.

Furness-Red Cross Line; from New York to St. John's N.F. (*fast passenger and cargo*).

Furness, Withy and Co., Ltd. *See* Furness-Red Cross Line and Warren Line.

Warren Line; from Liverpool to St. John's, N.F. (*fast passenger and cargo*).

CHINA AND JAPAN.

Ben Line Steamers, Ltd.; from Antwerp, Leith, London, and Middlesbrough to the Straits Settlements, China, and Japan (*cargo and a few passengers*).

Blue Funnel Line. *See* Holt and Co., Alfred.

British India Line; from Calcutta and Rangoon to Straits, China, and Japan (*passengers and cargo*).

Canadian Pacific Railway Co.; from Vancouver to Honolulu, Yokohama, Kobe, Nagasaki, Shanghai, Manila, and Hong Kong (*passengers and cargo*).

China Navigation Co., Ltd.; between Hong Kong and Shanghai and the Chief Ports of China, including Yangtsze Kiang Ports up to Chungking, Indo-China, Siam and Straits Settlements (*passengers and cargo*).

Clan Line; Glasgow and Liverpool to Pacific Island Ports *viâ* South Africa.

Furness, Withy and Co., Ltd. *See* Prince Line.

Glen Line and Shire Line; from London, calling at Port Said, Penang, Port Swettenham, Singapore, Hong Kong, Shanghai, Kobe, Yokohama, and Dalny or Vladivostock (*passengers and cargo*).

Holt and Co., Alfred; from Liverpool (part loading at Glasgow and Bristol Channel Ports), calling at Marseilles, both outwards and homewards in the case of the passenger vessels, and from Hamburg, Bremen, and Rotterdam to Straits, Philippines, China and Japan (*passengers and cargo*).

Java-China-Japan Lyn; from the Principal Ports of the Netherland East Indies to the Philippine Islands, China, Indo-China, and Japan, *vice versâ* (*passengers and cargo*).

Mogul Steamship Co.; from Birkenhead to Straits Settlements, China, and Japan.

Nippon Yusen Kaisha; from Yokohama, *viâ* China, Straits Settlements, Colombo, Suez, Naples, Marseilles, and Gibraltar to London (*passengers and cargo*).

Osaka Shosen Kaisha; North Continental Ports to China and Japan.

Peninsular and Oriental Line; from London and Marseilles to Straits Settlements, China and Japan (*mails, passengers and cargo*) (fortnightly).

Prince Line; from New York, Newport News and Los Angeles to Japan, China, and Philippines, *viâ* Panama; from China, Philippines, Dutch E. Indies, Straits Settlements, Colombo, and Naples to Boston and New York, *viâ* Suez (*fast cargo and passengers*).

Rickmers-Linie (monthly); from Antwerp and Hamburg to Fort Swettenham, Penang, Singapore, Manila, Hong Kong, Shanghai, Kobe, Yokohama, Dalny, and Vladivostock (*freight*).

Shire Line. *See* Glen Line and Shire Line.

Wilh. Wilhelmsen; from Norway, Sweden, Denmark, Finland, Hamburg, and Antwerp to principal ports of China and Japan (*cargo*).

FRANCE (NORTHERN), BELGIUM, ETC.

American-Hawaiian Steamship Co.; from Los Angeles, Portland, San Francisco, Seattle, and Tacoma to Antwerp, Hamburg, and Havre, calling at Glasgow, Liverpool, and London (*fortnightly cargo services*).

Bennett Line; frequent Regular Sailings from Goole to Boulogne and Calais each way, calling at Hull on return journey; from London to Boulogne, Calais and Dunkirk, each way.

Bristol Steam Navigation Co., Ltd.; from Bristol, Plymouth, Swansea and Gloucester to Amsterdam, Rotterdam, and Antwerp, and from Hamburg to Gloucester (*cargo*), and *vice versâ*.

British and Continental Steamship Co., Ltd.; between Liverpool, Manchester, Barrow, Whitehaven, and Rotterdam, Amsterdam, Dunkirk, Antwerp, Ghent, Terneuzen; Glasgow and Antwerp, Ghent, Terneuzen; Belfast, Ellesmere Port and Ghent, Dunkirk; Southampton and Antwerp, Rotterdam, Amsterdam.

Brussels Steamship Co., Ltd.; from London to Brussels (*cargo*), and *vice versâ*.

Burnham Shipping Co., Ltd.; from Cardiff to Antwerp, Rotterdam, and Hamburg (*cargo*).

Compagnie Générale Transatlantique; from London to Bordeaux, Nantes, and La Pallice (*passengers and cargo*).

Constantine and Co., Ltd., R.A.; from Middlesbrough to Antwerp, Ghent, Calais, Dunkirk, Havre, Rouen, Amsterdam, and Rotterdam (*cargo only*).

Cunard Line; from Liverpool to Havre every 10 days, and from Manchester, Glasgow, and Swansea to St. Malo and Dieppe as inducement offers (*cargo*).

Dens and Co., Ltd.; from London to Havre (*cargo*).

Ellerman and Bucknall Steamship Co., Ltd.; from Australia.

Ensign Shipping Co., Ltd.; from Hull and London to Amsterdam, Rotterdam, and Hamburg (*cargo*).

General Steam Navigation Co., Ltd.; from East Coast Ports of England to Hamburg, Bremen, Amsterdam, Rotterdam, Harlingen, Ostend, Ghent, Terneuzen, Antwerp, Dunkirk, Havre, Charente (*cargo*); Bordeaux (*passengers and cargo*).

Gibson and Co., Ltd., George; from Leith, Grangemouth, Dundee, Aberdeen, and Middlesbro' to Antwerp, Rotterdam, Amsterdam, Rouen, Dunkirk and Ghent (*cargo*).

Great Western Railway; Fishguard to and from Waterford (*passengers, cargo and live stock*); Fishguard to and from Rosslare (*passengers and cargo*); Weymouth to and from Guernsey (*passengers and cargo*); Weymouth to and from Jersey (*passengers and cargo*).

Head Line and Lord Line; Belfast, Cork, Dublin, and Londonderry to and from Amsterdam, Antwerp, Dunkirk, Hamburg, Ghent, Bremen, and Rotterdam (*chiefly cargo*).

Holland Steamship Co.; from London to Amsterdam (*passengers and cargo*).

Hull and Netherlands Steamship Co., Ltd.; from Hull to Rotterdam, Amsterdam and Harlingen (*passengers and cargo*).

Hutchison, Ltd., J. & P.; from West Coast Ports of Britain to Rouen, Nantes, Bordeaux and Hamburg (*cargo*).

Limerick Steamship Co., Ltd.; from Limerick, Fenit and Galway to Dunkirk, Calais, Havre, Rotterdam, Amsterdam, and Antwerp (*cargo*) and vice versa.

London and North-Eastern Railway (Great Central Section); from Grimsby to Antwerp, Hamburg and Rotterdam (*passengers and cargo*). (Great Eastern Section); from Harwich to Hook of Holland, Antwerp and Rotterdam (*cargo only*); **from Harwich to Zeebrugge** (*passengers—summer season only*); **from Harwich to Zeebrugge, Train Ferry Service** (*cargo only*).

London, Midland and Scottish Railway (Goole Steam Shipping); from Goole to Dutch, Belgian, German, French, and Danish Ports (*passengers and goods*).

Lord Line. *See* Head Line and Lord Line.

Marine Mercantile Co., Ltd.; from East Coast Ports of England to Rotterdam, Antwerp, Amsterdam, and Havre (*cargo*).

Ocean Belgian Steam Navigation Co., Ltd. *See* Dens and Co.

Park, Ltd., R. and J.; from London to North French Ports (*cargo*).

Rankine and Son, Ltd., James; from Leith and Grangemouth to Antwerp, Rotterdam, Amsterdam, Dunkirk, and Ghent (*cargo*), Rouen, Bordeaux, Nantes.

Roland-Linie Aktien-Gesellschaft; from Hamburg to England (different lines), Belgium and France (different lines); Dampfschiffahrtsgesellschaft ARGO m.b.H.; from Bremen to England (different lines).

Royal Mail Steam Packet Co.; from Liverpool and Southampton to French, Spanish, and Portuguese Ports, Madeira, Las Palmas, Teneriffe, St. Vincent (C.V.), Brazil, Uruguay, and Argentina (*passengers, mails, and cargo*).

Walford Lines, Ltd.; from U.K. Ports to France, Belgium and Holland.

Wilsons and N.E.R. Shipping Co., Ltd.; from Hull to Dunkirk, Ghent, Antwerp and Hamburg.

Zeeland Steamship Co., Netherlands Royal Mail Line; from Harwich (Parkeston Quay) to Flushing (*daily day service, mails, cargo and passengers*).

INDIA, BURMAH AND CEYLON.

Anchor Line; Glasgow and Liverpool to Gibraltar, Port Said, Suez, Port Sudan, and Bombay (*fortnightly, passengers and cargo*). *Note.*—On the return voyage, the vessels call at Marseilles in addition.

Anchor-Brocklebank and Well Lines; Newport, Swansea, Manchester, Glasgow and Liverpool to Calcutta direct (*cargo*); Hamburg, Rotterdam, Antwerp, Middlesbrough, and London to Port Said, Colombo, Madras and Calcutta (*cargo*).

Anderson, Green and Co., Ltd. *See* Orient Line.

Asiatic Steam Navigation Co., Ltd.; from Calcutta to Chittagong and Rangoon; from Calcutta to Rangoon and Moulmein; from Calcutta to Bombay *viâ* Ceylon, calling at Coast Ports; from Calcutta, Rangoon, and Madras to Port Blair (Andaman Islands) (*mails and passengers in all cases*).

Bibby Line; from Liverpool and London to Marseilles, Port Said, Port Sudan, Colombo, Rangoon, and Straits Settlements (*passengers and cargo*).

Blue Funnel Line. *See* Holt and Co., Alfred.

Bombay and Persia Steamship Steam Navigation Co.; between Indian and Red Sea Ports.

British India Line; from London and Middlesbrough to Colombo, Madras and Calcutta, and Bombay and Karachi (*passengers and cargo*); coasting to all principal Ports in Japan, China, Straits, India, Burma, Ceylon, and Persian Gulf from Calcutta and/or Bombay (*passengers and cargo*).

City Line; from Glasgow and Liverpool to Principal Ports of India (*passengers and cargo*).

Clan Line; Glasgow, Manchester, Liverpool to Bombay and Malabar Coast Ports; Glasgow, Liverpool to Colombo, Madras, Calcutta, Chittagong; Chittagong and Madras Coast to U.K./Continent; Chittagong Madras and Malabar Coasts to to U.S.A.; Calcutta to River Plate.

Ellerman and Bucknall Steamship Co., Ltd.; New York and U.S.A. Atlantic Ports to Indian Ports (*passengers and cargo services*).

Ellerman and Bucknall Steamship Co., Ltd.; to New York (*regular passenger and cargo services*).

Ellerman and Bucknall Steamship Co., Ltd.; United Kingdom and Continental Ports to Persian Gulf (*regular cargo service*).

Hall Line; Outward services: from Liverpool to Bombay, Port Okha, Bedi Bunder, and Karachi, *viâ* Suez Canal (*passengers and cargo*); these vessels sometimes load at Newport, Swansea, Glasgow and Manchester, and occasionally call at Marseilles and Naples; from Liverpool to Marmagao and Malabar Coast Ports; from Middlesbrough and Continent to Rangoon. Homeward services: from Bombay to Marseilles, Barcelona, Antwerp, Dunkirk, Liverpool, Manchester, and Glasgow (*passengers and cargo*); from Karachi as from Bombay; from Madras Coast to Marseilles, Dunkirk, Antwerp, Rotterdam, London, and Liverpool (*cargo*); from Malabar Coast to Marseilles, Liverpool, London, and Antwerp (*cargo*); from Rangoon to Alexandria, London, Hamburg, Antwerp, Hull, Avonmouth, and Liverpool (*cargo*).

Hamburg-American Line; Hamburg to the Far East (Line A, weekly; Line B, fortnightly).

Harrison Line; from Liverpool, Newport and Swansea to Calcutta (*cargo*).

Henderson and Co., P.; from Glasgow and Liverpool to Rangoon, *viâ* Marseilles.

Holt and Co., Alfred; from Colombo to Liverpool (*passengers and cargo*), not calling at Colombo outwards.

Houston Line: from Canada (*cargo services, carrying a few passengers*).

Orient Line (Mail Steamers); from Tilbury the vessels call at Colombo, on their way to Australia, and also on the return voyage (*passengers, cargo, and mails for Commonwealth of Australia*).

Peninsular and Oriental Line; from London and Marseilles to Bombay and Colombo, calling at Port Said and Aden (*mails, passengers, and cargo*) (weekly); from London to Colombo and Calcutta, calling at Malta (occasionally), Port Said and Aden (*passengers and cargo*) (usually fortnightly).

Prince Line, Ltd.; from Colombo to Boston and New York (*viâ* Suez and Naples) (*fast, cargo, passenger*).

Turner and Co. *See* Asiatic Steam Navigation Co., Ltd.

Wilh. Wilhelmsen; from Norway, Sweden, Denmark, Finland, Hamburg and Antwerp to Principal Ports of India and Ceylon (*cargo*).

THE MEDITERRANEAN, PORTUGAL, AND SPAIN.

Anchor Line; Cruises: Glasgow—New York to West Indies; Glasgow—New York to Mediterranean.

Anderson, Green and Co., Ltd. *See* Orient Line.

Armstrong, Lord and Co.; from Ports on East Coast of United Kingdom to principal Mediterranean Ports (*cargo*).

Bibby Line; from Liverpool and London to Marseilles, Port Said, and Palestine (*passengers and cargo*).

Bland Line; from Gibraltar to Tangier and Casablanca on Tuesdays (*mail, passenger and cargo line*). Frequent sailings to Melilla, Ceuta, Tetuan, Larache, and all ports in the Morocco Coast (*passenger and cargo service*).

British India Line; from London and Middlesbrough to Marseilles and Malta (*passengers and cargo*).

Burnham Shipping Co., Ltd.; from Cardiff to Marseilles, Algiers, Tangier, and Gibraltar (*cargo*).

Compagnie des Messageries Maritimes; from Port St. Louis to Marseilles, Bizerta, Alexandria, Port Said, Beyrouth, Tripoli, Caiffa, and Jaffa (*cargo*).

Compagnie Générale Transatlantique, Ltd.: Marseilles to Algiers, Tunis, Oran, Philippeville, Bona and Bizerta (*passengers, cargo, and mails*).

Compagnie Havraise Péninsulaire de Navigation à Vapeur; from Havre, Dunkirk, and Rouen to Algeria (*passengers and cargo*).

Compañia Transmediterránea; from Cadiz to Canary Islands; from Algeciras to Ceuta; from Algeciras and Cadiz to Tangier (*passengers, cargo, and mails*).

Cunard Line; from Liverpool, Manchester and Swansea to Casablanca, Gibraltar, Oran, Algiers, Genoa, Leghorn, Naples, Palermo, Messina, Catania, Corfu, Brindisi, Bari, Gruz, Ancona, Venice, Trieste and Fiume; from Liverpool, Manchester, Glasgow and Swansea to Gibraltar, Malta, Patras, Piræus, Syra, Volo, Salonica, Smyrna, Constantinople, Bourgas, Varna, Canstanza (*cargo*).

Dens and Co., Ltd.; from Newcastle-on-Tyne to principal Mediterranean Ports.

Deutsche Ost-Afrika Linie; from Hamburg, Antwerp, and Southampton to Lisbon, Tangiers, Malaga, and Genoa (*passengers*).

Dickinson and Co., Ltd., William; from the Tyne to Bilbao and Santander.

Ellerman and Bucknall Steamship Co., Ltd.; from New York (*regular cargo services*) to principal Mediterranean, Levant, and Black Sea Ports.

Ellerman's Wilson Line; from Hull to Tangier and Algiers (*passengers and cargo*); from Hull to Gibraltar, Malta and Alexandria; Marseilles, Genoa, Leghorn, Naples, and Sicily; Piræus, Salonica, Smyrna, and Constantinople; Gravosa (Gruz), Trieste, Fiume, Venice, and Bari; Lisbon and Oporto; Spanish Ports.

Furness, Withy and Co., Ltd. *See* Johnston Line, and Prince Line.

General Steam Navigation Co, Ltd.; from London to Oporto, West Italian and Sicilian Ports (*cargo*).

Glen Line and Shire Line; from London, calling at Port Said (*passengers and cargo*).

Glynn and Son, Ltd., John; from Liverpool to principal Mediterranean Ports, particularly West Italy and Sicily (*cargo*).

Golden Cross Line, from Bristol, Cardiff, and Swansea to principal Mediterranean Ports (*cargo*), and *vice versâ*.

Hamburg-American Line (Afrika-Dienst); from Hamburg, Antwerp and Southampton to Peninsular and Mediterranean Ports (*passengers and cargo*).

Hogarth and Sons, H.; from Glasgow to Lisbon and Huelva (*cargo*).

Johnston Line; from Antwerp, Swansea, and Liverpool to Piræus, Syria, Volo, Salonica, Smyrna, Constantinople, Bourgas, Varna, Constanza, Sulina, Galatz, and Braila (*cargo*).

Koninklijke Nederlandsche Stoomboot Maatschappij; *Cargo Lines*: between Holland and Hamburg, Scandinavia, Baltic, France, Portugal, Spain, Morocco, Mediterranean, Adriatic Sea, Levant, Black Sea, Roumania, and *Passenger, Mail and Cargo Lines* to the West Indies, Central America, and the West Coast of South America.

MacAndrews and Co., Ltd.; from London, Liverpool, Glasgow, Hull, Middlesbrough, Swansea, Antwerp, and Hamburg to Lisbon, Gibraltar and the Principal Ports of Spain (*cargo and a few passengers*).

Moss Line; from Liverpool, Glasgow, and Swansea to Alexandria, calling at Gibraltar, Algiers, and Malta; from Liverpool, Glasgow, and Swansea to Constantinople, calling at Gibraltar, Oran, Malta, Syra, Smyrna, Salonica, Piraeus and Volo: from Liverpool, Glasgow, and Swansea to Beyrouth, calling at Casablanca, Gibraltar, Malta, Famagusta, Larnaca, Limassol, Alexandretta, Haifa, and Mersyne, Jaffa, and Port Said; from Liverpool to Bordeaux; from Liverpool, Glasgow, and Swansea to Casablanca and all Moroccan Ports (*all cargo services*).

Nelson, Ltd., H. and W.; from London to Buenos Aires, calling on the outward journey at Boulogne, Corunna, Vigo, Lisbon, Las Palmas G.C., Rio de Janeiro, and Monte Video, and on the homeward journey at Monte Video and Las Palmas; from Liverpool to Buenos Aires, calling at Monte Video, and at Las Palmas on the homeward voyage (*cargo, passengers, and mails*).

Ocean Belgian Steam Navigation Co., Ltd. *See* Dens and Co.

Orient Line (Mail Steamers); from Tilbury to Colombo, Fremantle, Adelaide, Melbourne, Sydney, and Brisbane, calling at Gibraltar, Toulon, Naples, and Port Said. On the homeward voyage the vessels call at Plymouth (*passengers, cargo, and mails for Commonwealth of Australia*).

Papayanni Line; from Liverpool to principal Mediterranean Ports (*passengers and cargo*).

Peninsular and Oriental Line; from London to Gibraltar and Marseilles (*passengers, mails, and cargo*) (weekly). Malta (fortnightly).

Power Steamship Co., Ltd.; from London to principal Mediterranean Ports (*cargo*).

Prince Line, Ltd.; from Leith, Tyne, Middlesbrough, Antwerp, and London to Malta, Alexandria, Palestine, Syria, Asia Minor and Cyprus (*cargo and passengers*); from Manchester to Tunis, Malta, Alexandria, Palestine, Syria, Asia Minor and Cyprus, with homeward services to Liverpool and Manchester (*cargo and passengers*).

Roland-Linie Aktien-Gesellschaft; from Bremen to the Canary Islands, the Mediterranean and Levant Ports.

Rotterdam-Zuid Amerika Lijn; from Antwerp, Rotterdam to Santos, Rio de Janeiro and Santa Fé, calling at Oporto and Lisbon (*cargo*). *N.B.*—The Rotterdam-Zuid Amerika Lijn runs two services, viz.: (A) A fortnightly service for passengers, mail, and cargo from Hamburg and Rotterdam direct to Montevideo and Buenos Aires. (B) A four-weekly service for cargo from Antwerp, Rotterdam, Oporto, and Lisbon to Rio de Janeiro, Santos, and Santa Fé. The homeward service is a fortnightly one for passengers and cargo from Buenos Aires, Santos, Rio de Janeiro, Victoria, and Bahia to Rotterdam and Hamburg.

Royal Mail Steam Packet Co.; from Southampton and Liverpool to French, Spanish, and Portuguese Ports, Las Palmas, Teneriffe, St. Vincent (C.V.), Brazil, Uruguay, and Argentina (*passengers, mails, and cargo*).

Shire Line. *See* Glen Line and Shire Line.

Sloman (Rob. M. Jr.) Mittelmeer-Linie; from Hamburg to Spain and chief Mediterranean Ports (*passengers and cargo*).

Sota y Aznar; from Glasgow, Liverpool, and Swansea to Spanish Ports and back from Mediterranean Ports to West British Coast Ports (*cargo*).

Strick, Frank C. and Co., Ltd.; from London, Glasgow, Manchester, and Marseilles. Also alternate monthly sailings from Amsterdam and Antwerp to Port Said, Port Sudan, Aden, Bahrein, Bunder Abbas, Bushire, Bandar Shahpour, Mohammerah and Basra. Cargo is also taken on through Bills of Lading to Bagdad and Ahwaz. *Note.*—Cargo is also accepted for other Persian Gulf Ports with the option of transhipment at Bunder Abbas unless there is sufficient to warrant steamer calling direct.

Union-Castle Line: from London to Gibraltar, Marseilles, Genoa, Port Said, Suez, Port Sudan, and Aden to East African Ports and Natal (*passengers, mails, and cargo*).

Westcott and Laurance Line, Ltd.; from Leith, Tyne, Antwerp, and London to Gibraltar, Malta, Alexandria, Piraeus, Salonica, Smyrna, Constantinople, Bulgarian and Danubian Ports (*cargo and passengers*).

Yeoward Line; from Liverpool to Lisbon, Madeira, and Canary Islands (*passengers and cargo*).

STRAITS SETTLEMENTS AND EAST INDIES.

Asiatic Steam Navigation Co., Ltd.; from Indian Ports to Principal Ports of Java (*mails and passengers*).

Ben Line of Steamers, Ltd.; from Antwerp, Leith, London, and Middlesbrough to Chief Ports of Straits Settlements, China, and Japan (*cargo and a few passengers*).

Blue Funnel Line. *See* Holt and Co., Alfred.

British India Line; from Calcutta to Rangoon, Penang, Port Swettenham, and Singapore (*mails, passengers, and cargo*).

Compañia Transatlantica; from Liverpool to Singapore, Philippines, Manila, Iloilo, Cebu, Cavite, and Zamboanga (*passengers, mails, and freight*).

Ellerman and Bucknall Steamship Co., Ltd.; from New York and Gulf Ports (*fortnightly cargo service*); from German, French and Dutch Ports (*monthly cargo service, also passenger sailings*); from Australia and Java to Straits Settlements (*regular cargo and passenger services*); from Canada to Java (*monthly cargo service*).

Furness, Withy and Co., Ltd. *See* Prince Line.

Glen Line and Shire Line; from London, calling at Port Said, Penang, Port Swettenham, Singapore, Hong Kong, Shanghai, Kobe, Yokohama, and Dalny or Vladivostock (*passengers and cargo*).

Holt and Co., Alfred; from Hamburg, Amsterdam, and Liverpool to the Dutch East Indies; from New York to the Dutch East Indies; from Singapore to Sumatra; from West Australia to Singapore (*passengers and cargo*).

Huddart Parker, Ltd.; from Sydney to Auckland and Wellington (*mails, passengers, and cargo*); from Sydney, Melbourne, Adelaide to and from Fremantle (*mails, passengers, and cargo*); from Sydney to and from Hobart (*mails, passengers, and cargo*); from Melbourne to and from Launceston (*passengers, cargo, and mails*).

Osaka Shosen Kaisha; from Antwerp, Rotterdam, Hamburg and Port Said to Singapore, Hongkong, Shanghai, Dairen, Kobe, Osaka and Yokohama, returning Yokohama, Kobe, Dairen, Shanghai, Hongkong, Singapore, Colombo, Aden, Port Sudan, Port Said, London, Hamburg, Rotterdam, Antwerp.

Parker, Ltd., Huddart. *See* Huddart Parker, Ltd.

Peninsular and Oriental Line; from London and Marseilles to the Straits Settlements, China, and Japan, *viâ* Port Said, Aden, and Colombo (*mails, passengers, and cargo*) (fortnightly).

Prince Line; from New York, Newport News, and Los Angeles to Japan, China, and Philippines *viâ* Panama Canal; from China, Philippines, Dutch East Indies, and Straits Settlements, and Colombo and Naples to Boston and New York, *viâ* Suez (*cargo and passengers*).

Rickmers-Linie; from Antwerp and Hamburg to Penang, Singapore, Hong Kong, Shanghai, Kobe, Yokohama, Dalny, and Vladivostock (*freight*).

Shire Line. *See* Glen Line and Shire Line.

Stoomvaart Maatschappij, N.V. "Nederland"; from Amsterdam, Southampton, Alger, and Genoa to Egypt, Colombo, Singapore, and Dutch East Indies (*passengers and cargo*).

Thomson and Co. *See* Ben Line of Steamers, Ltd.

Turner and Co. *See* Asiatic Steam Navigation Co.

Union Steam Ship Co. of New Zealand, Ltd.; from Vancouver, Honolulu, Suva (Fiji), Auckland to Sydney; from San Francisco, Papete (Tahiti), Rarotonga, Wellington to Sydney (*mails, passengers, and cargo*).

Weir and Co., Andrew; from Cape Town, Mossel Bay, Port Elizabeth, East London, Durban, Lourenço Marques, and Mauritius to Singapore, Bangkok, and Hong Kong (*passengers and cargo*).

Wilh. Wilhelmsen; from Norway, Sweden, Denmark, Finland, Hamburg, and Antwerp to the chief ports of the Straits Settlements, China, and Japan (*cargo*).

UNITED STATES OF AMERICA.

American Hawaiian Steamship Co.; from Antwerp, Glasgow, Hamburg, Havre, Liverpool, and London to Portland, Los Angeles, San Francisco, Seattle, and Tacoma (*fortnightly cargo sailings*).

Anchor Line; Glasgow and Moville or Belfast to New York; Glasgow to Boston (*passengers and cargo*).

Atlantic Transport Co. of West Virginia; from London to New York (*passengers and cargo*).

Atlantic Transport Line; from London to New York (*passengers and cargo*); from London to Philadelphia, Baltimore, and Norfolk (*cargo only*).

Blue Funnel Line. *See* Holt and Co., Alfred.

Bristol City Line of Steamships, Ltd.; from Bristol, Cardiff, and Swansea to New York and Eastern Seaboard Ports (*cargo*) and vice versa.

Cairns, Noble and Co., Ltd.; from Calais, Hamburg, Hull, Middlesbro', Leith, and Dundee to Portland (Maine) (*cargo*).

Cairn-Thomson Line; from Leith and Newcastle to Portland, Me. (Winter) (*cargo*).

Canadian Pacific Railway Co.; from Vancouver to Victoria, Nanaimo, Gulf Islands, West Coast of Vancouver Island, Powell River, Union Bay, Comox, Alert Bay, Prince Rupert, Ketchikan, Wrangel, Juneau, Skagway (*passengers and cargo*); from Vancouver to Seattle, *viâ* Victoria and direct (*passengers and cargo*).

Castle Line; from Antwerp to Galveston and Houston and *vice versâ* (*carrying a few passengers*).

Clan Line; New York to South Africa, Mauritius, and Madagascar.

Clyde Steamship Co.; from New York to Jacksonville and Charleston, S.C. (*cargo and passengers*); from New York to Wilmington (*cargo*); between Boston, Charleston, and Jacksonville (*cargo*).

Clyde Steamship Co.; from New York to Miami (*cargo and passengers*); from Jacksonville to Miami (*cargo*); New York to Baltimore (*cargo*); Miami to Orleans, *viâ* Key West (*cargo*).

Compagnie Générale Transatlantique; from Plymouth and Havre to New York (*passengers and cargo*); Bordeaux to New York.

Cunard Line; from Southampton, Liverpool, London, Queenstown, Belfast, Glasgow, Cherbourg, Havre to New York (*passengers and cargo*); Liverpool and Queenstown to Boston (*through passenger and freight bookings to and from all parts of the world*); London to Boston, Baltimore, and Philadelphia (*cargo*).

Dalgleish Ltd., R. S.; from Liverpool to Galveston, New York and Newport News (*cargo*).

Donaldson Line; from Glasgow to Baltimore; from Glasgow to Newport News, Va.; from Glasgow and Liverpool to Savannah, Ga. (*cargo service only*).

Ellerman and Bucknall Steamship Co., Ltd.; Manchester to New York (*monthly cargo service*); from United Kingdom and Continent to Pacific Ports (*monthly cargo service*).

Ellerman's Wilson Line; from Hull, Aberdeen, Newcastle-on-Tyne and Antwerp to New York and Boston (*cargo*).

Furness Line; from London to Philadelphia and New York (*cargo*); from Dundee to Philadelphia and New York (*cargo*); from London, Liverpool, Glasgow, and Manchester to Los Angeles, Portland, Ore., San Francisco, Seattle and Tacoma.

Furness, Withy and Co., Ltd. *See* Cairn-Thomson: Furness Line; Johnston Line; Manchester Liners; Prince Line; and Warren Line.

Hamburg-American Line; Hamburg, Southampton, also from Cobh (*passengers only*), to New York (*freight and passengers*); from Hamburg to Boston and New York (*freight and passengers*); from Hamburg to Philadelphia, Baltimore and Norfolk (*freight*).

Hamburg American Line; Hamburg to West Coast Ports of North America (*freight*).

Harrison Line; Calcutta to River Plate and Calcutta to Savannah, New Orleans, and Galveston.

Head Line and Lord Line; to Belfast, Dublin, Cork, and Londonderry from New Orleans, Galveston, Baltimore, Montreal, and Quebec (*chiefly cargo*).

Holland America Line; from Rotterdam to New York, Newport News, Norfolk, and Baltimore, and Boston and Philadelphia (*cargo*).

Holland America Line; from Rotterdam (*mails, passengers, cargo*), Boulogne, and Southampton (*mails, passengers only*), to New York.

Holland America Line; from Hamburg, Bremen, Rotterdam (*passengers and cargo*); Antwerp, Swansea, or London (*passengers and cargo*) to Colon, Los Angeles, San Francisco, Seattle.

Holt and Co., Alfred; from Boston and New York to Straits, Philippines, China and Japan, transhipment to Borneo, Cochin China, Korea and Siberia *viâ* Panama and Suez; to the Dutch East Indies (*cargo services carrying a few passengers*).

Houston Lines; from River Plate; from South Africa (*both cargo services, carrying a few passengers*).

International Mercantile Marine Co.; weekly sailings from Antwerp to New York, *viâ* Southampton and Cherbourg and fortnightly sailings from Antwerp to Halifax, N.S., and New York, *viâ* Southampton and Cherbourg. Return voyages, steamers leave New York for Antwerp, *viâ* Cherbourg and Plymouth (Red Star Line Service).

Johnston Line, Ltd.; from Liverpool to Baltimore (*cargo*).

Lamport and Holt; from New York to North Brazil and *vice versâ*; from New York to Central and South Brazil; from New York to River Plate Ports; from New York to Manchester; from Brazil to New York; from Brazil to New Orleans; from River Plate to the United Kingdom and/or Continent, *viâ* Canary Islands; from River Plate to Boston and New York *viâ* Brazil; from River Plate and Brazil to Liverpool, *viâ* Portugal and Spain.

Leyland Line; from Manchester and Liverpool to Boston, Philadelphia, Baltimore, and Norfolk; London to Boston; Liverpool to New Orleans; Manchester to New York.

Lord Line. *See* Head Line and Lord Line.

Manchester Liners; Manchester to Quebec and Montreal, St. John (N.B.), Philadelphia, Baltimore, Norfolk (Va.), and Newport News; St. Lawrence, weekly, and Philadelphia, service under normal conditions, fortnightly.

Morgan Line. *See* Southern Pacific Steamship Lines.

Nippon Yusen Kaisha; from Hong Kong, Honolulu, Yokohama, Kobe, Dairen, Nagasaki, Shanghai, and Manila to San Francisco (*passengers and mails*).

North German Lloyd; from Hamburg, Bremen and Antwerp to the West Coast of North America.

Prince Line, Ltd.; from New York, Newport News and Los Angeles to Japan, China and Philippines (*viâ* Panama); from China, Philippines, Dutch East Indies, Straits, Colombo and Naples to Boston and New York (*viâ* Suez) (*fast cargo and passenger*).

Red Star Line Service. *See* International Mercantile Marine Co.

Royal Mail Steam Packet Co.; from Rotterdam, Antwerp, London, and Swansea to Los Angeles, San Francisco, Seattle, Tacoma, Portland (Ore.), and Astoria, *viâ* Panama Canal; from Pacific Ports to Liverpool, Southampton, London, Rotterdam, Hamburg, Bremen and Antwerp (*passengers and cargo*).

Southern Pacific Steamship Lines; from New York to New Orleans (*passengers and cargo*); New York to Galveston and Houston, and Baltimore to Galveston (*cargo only*).

Warren Line; from Liverpool to St. Johns, Newfoundland, Halifax, Nova Scotia, and Boston (*cargo and passengers*).

White Star Line; from Southampton and Cherbourg to New York (*passengers, cargo, and Royal and United States Mail Services*); from Liverpool to New York (*passengers, cargo, and Royal and United States Mail Services*); from Liverpool and Queenstown to Boston, Mass. (*passengers*); from Queenstown to New York (*passengers*); from Belfast and Glasgow to Boston, Mass. and New York (*passengers*).

Wilh. Wilhelmsen; from Norway, Sweden, Denmark, and Finland to Boston, Philadelphia, Baltimore, Newport News, Savannah, New Orleans, and Galveston (*cargo and a few passengers*).

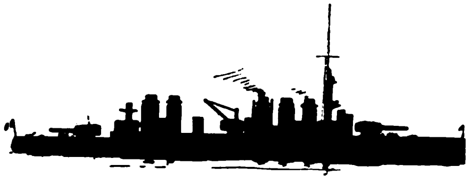
PROFILES OF
BRITISH AND FOREIGN WARSHIPS.

1

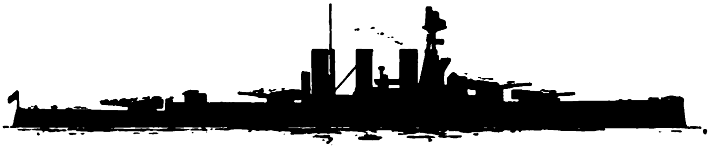
CAPITAL SHIPS.

[In order to facilitate identification, the ships are arranged in accordance **with the number of funnels and masts**, as these are the features most easily distinguished at a distance. The page indicated, in the case of warships, refers the reader to the table where full particulars of the ships will be found. All the profiles are drawn to the scale ⅛ in. = 100 ft.]

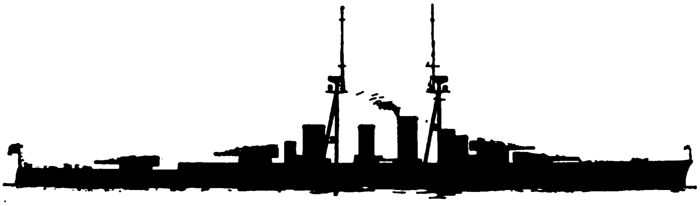
[Indexes to the names of vessels of which profiles are included in this section are given at the end of the volume.]



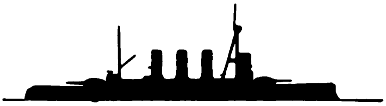
FRANCE. Battleships. Condorcet, Diderot. (See p. 310.)



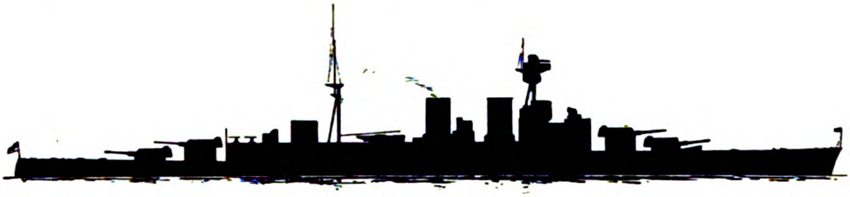
GREAT BRITAIN. Battle-cruiser. Tiger. (See p. 298.)



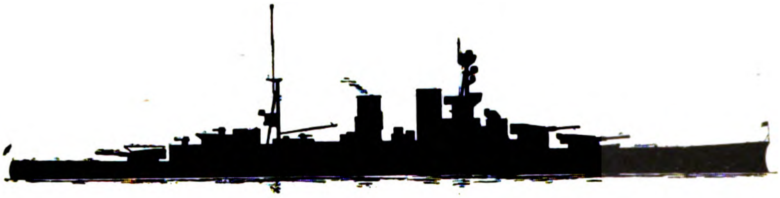
JAPAN. Battle-cruiser Kongo. (See pp. 320 and 321.)



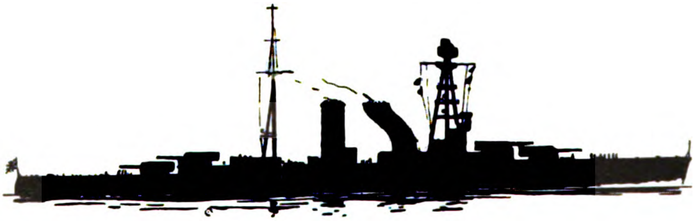
SWEDEN. Battleship. Oscar II. (See p. 329.)



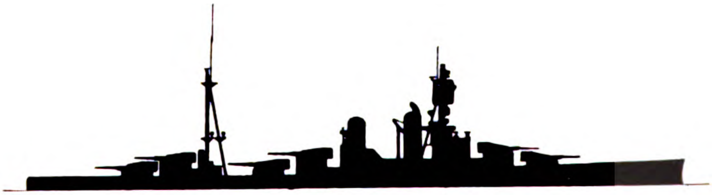
GREAT BRITAIN. Battle-cruiser. Hood. (See p. 296.)



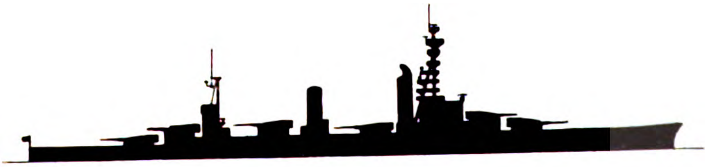
GREAT BRITAIN. Battle-cruisers. Renown, Repulse. (See p. 297.)



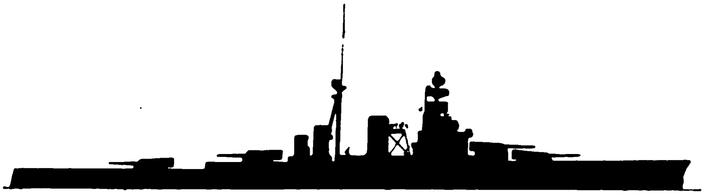
JAPAN. Battleships. Mutsu, Nagato. (See p. 321.)



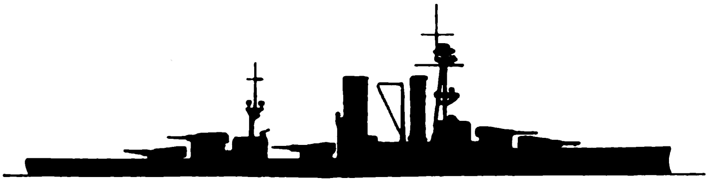
JAPAN. Battleships. Ise, Hyuga. (See p. 320.)



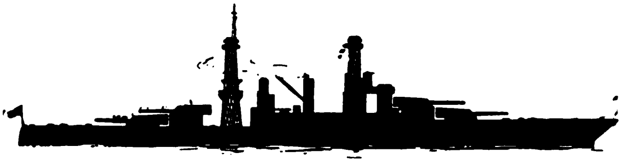
JAPAN. Battleships. Fuso, Yamashiro. (See pp. 320 and 321.)



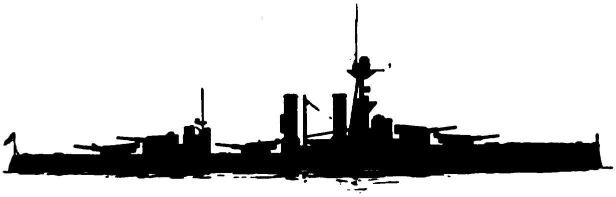
JAPAN. Battle-cruisers. Hiyei. Haruna, Kirishima. (See p. 320.)



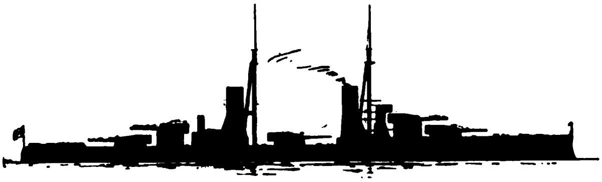
CHILE. Battleship. Almirante Latorre. (See p. 308.)



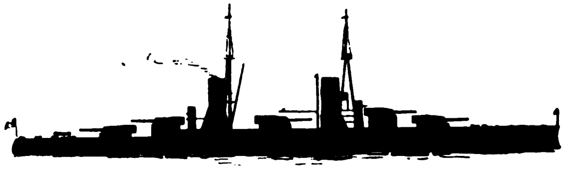
UNITED STATES. Battleships. California, Colorado, Maryland, Tennessee, West Virginia. (See pp. 330, 331, and 333.)



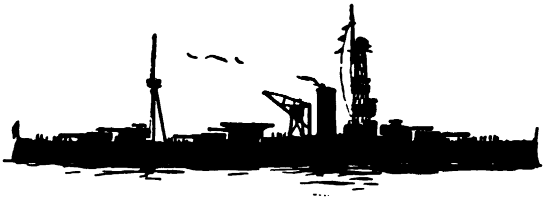
GREAT BRITAIN. Battleships. Emperor of India, Iron Duke, Marlborough. (See p. 296.)



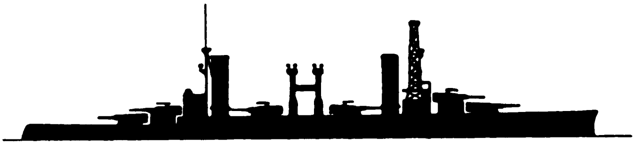
ITALY. Battleships. Andrea Doria, Caio Duilio. (See p. 317.)



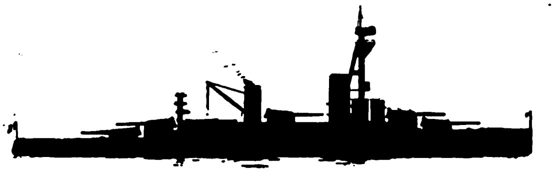
ITALY. Battleships. Conte Di Cavour, Giulio Cesare. (See p. 317.)



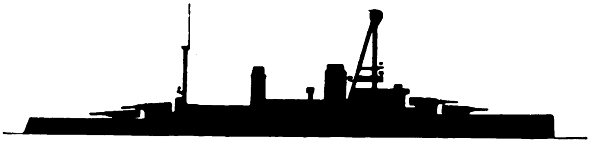
UNITED STATES. Battleships. Arkansas, Wyoming. (See pp. 330 and 333.)



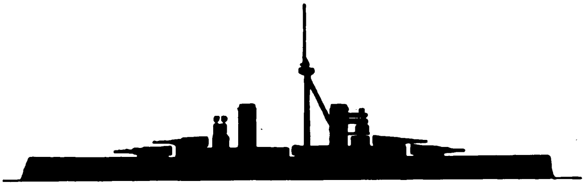
ARGENTINE. Battleships. Moreno, Rivadivia. (See p. 306.)



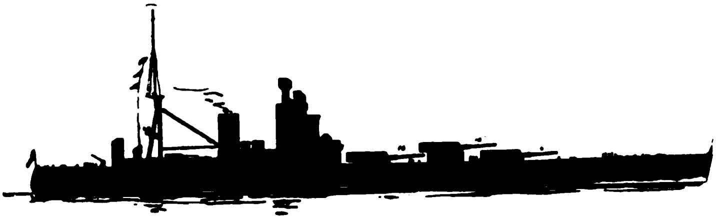
FRANCE. Battleships. Bretagne, Lorraine, Provence. (See pp. 310 and 311.)



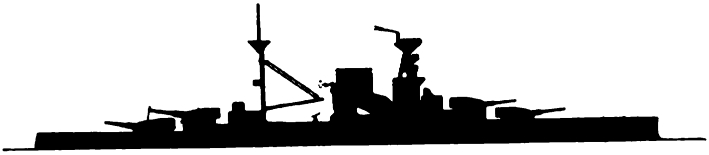
FRANCE. Battleships. Courbet, Jean Bart, Paris. (See pp. 310 and 311.)



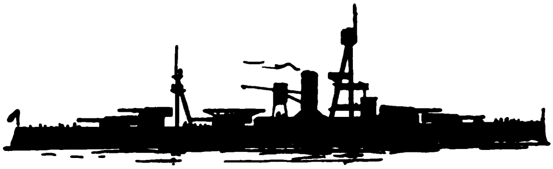
BRAZIL. Battleships. Minas Geraes, São Paulo. (See p. 307.)



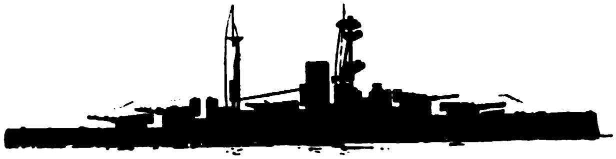
GREAT BRITAIN. Battleships. Nelson, Rodney. (See p. 297.)



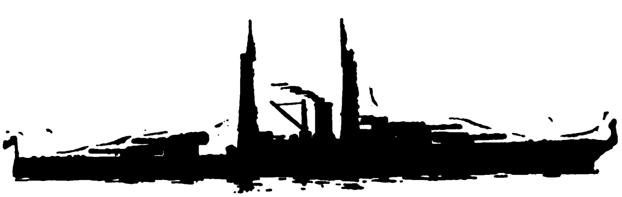
GREAT BRITAIN. Battleships. Queen Elizabeth, Warspite, Barham, Valiant, Malaya. (See pp. 297 and 298)



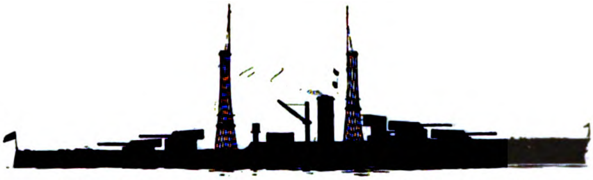
UNITED STATES. Battleships. New York, Texas. (See pp. 332 and 333.)



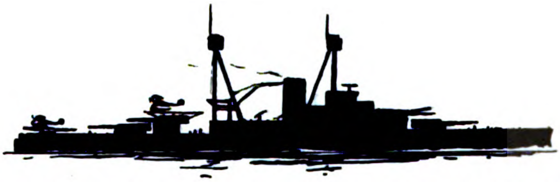
GREAT BRITAIN. Battleships. Ramillies, Resolution, Revenge, Royal Oak, Royal Sovereign. (See p. 297.)



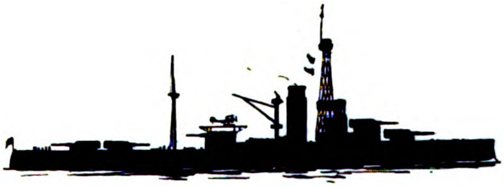
UNITED STATES. Battleships. Idaho, Mississippi, New Mexico. (See pp. 331 and 332.)



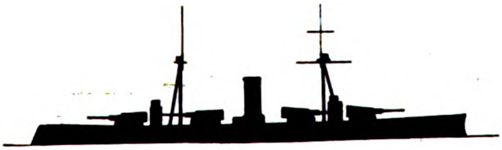
UNITED STATES. Battleships. Arizona, Pennsylvania. (See pp. 330 and 332.)



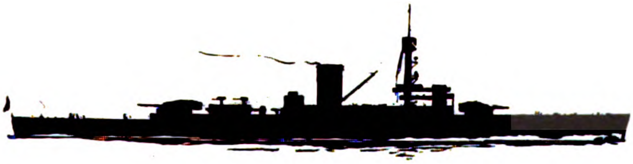
UNITED STATES. Battleships. Nevada, Oklahoma. (See p. 332.)



UNITED STATES. Battleships. Florida, Utah. (See pp. 331 and 333.)

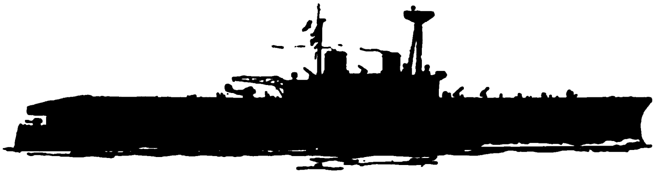


SPAIN. Battleships. Alfonso XIII., Jaime I. (See p. 327.)

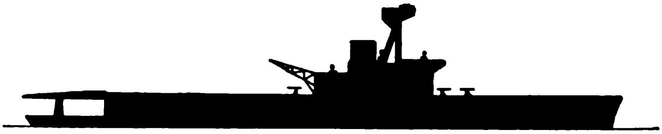


GERMANY. Battleship. Ersatz Preussen. (See p. 314.)

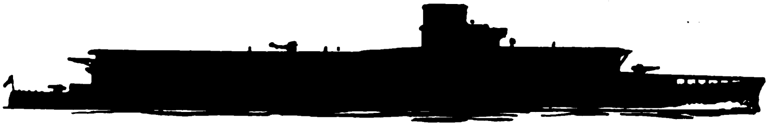
AIRCRAFT CARRIERS.



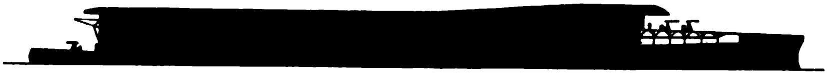
GREAT BRITAIN. Aircraft Carrier. Eagle. (See p. 301.)



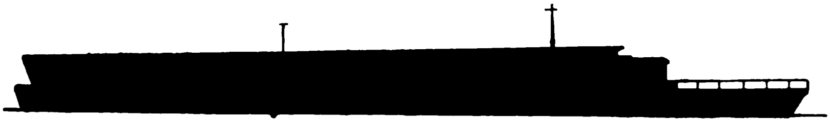
GREAT BRITAIN. Aircraft Carrier. Hermes. (See p. 302.)



GREAT BRITAIN. Aircraft Carriers. Courageous, Glorious. (See p. 299.)

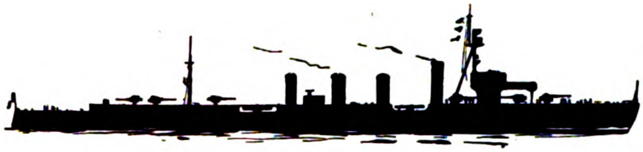


GREAT BRITAIN. Aircraft Carrier, Furious. (See p. 302.)

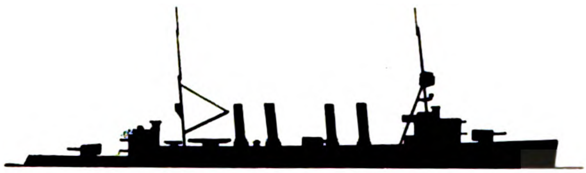


JAPAN. Aircraft Carrier. Akagi. (See p. 322.)

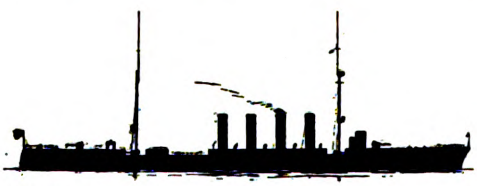
CRUISERS.



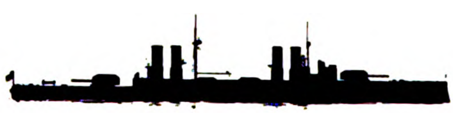
JAPAN. **Cruisers.** **Abukuma, Naka, Sendai, Jintsu.** (See pp. 322 and 323.)



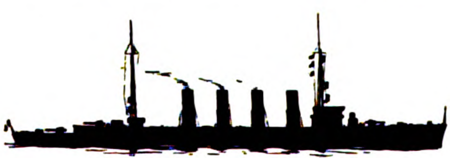
UNITED STATES. **Light Cruisers.** **Cincinnati, Concord, Detroit, Marblehead, Memphis, Milwaukee, Omaha, Raleigh, Richmond, Trenton.** (See pp. 334 and 335.)



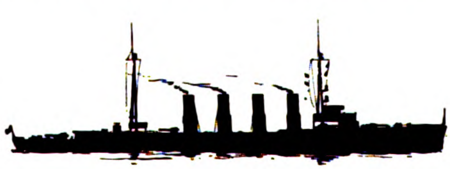
JAPAN. **Cruisers.** **Chikuma, Hirado, Yahagi.** (See p. 322.)



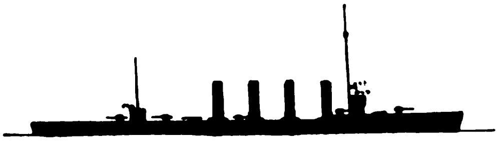
ITALY. **Armoured Cruisers.** **San Giorgio, San Marco.** (See p. 317.)



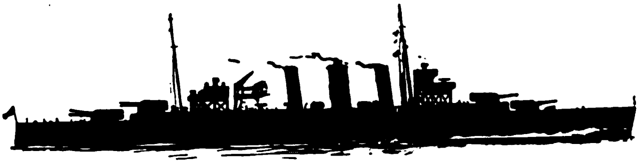
FRANCE. **Light Cruiser.** **Mulhouse** (*ex-German* **Stralsund**). (See p. 313)



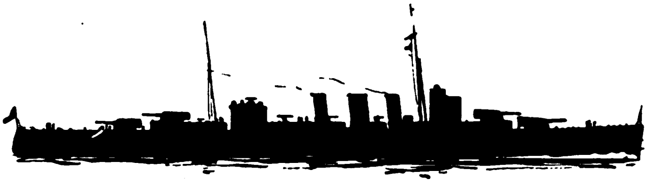
ITALY. **Light Cruiser.** **Taranto** (*ex-German* **Strassburg**). (See p. 319.)



FRANCE. Light Cruiser. Thionville (*ex-Austrian* Novara). (See p. 313.)

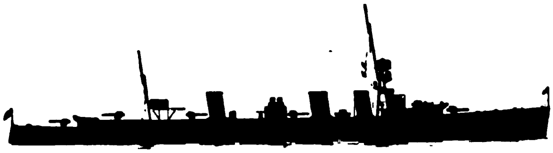


GREAT BRITAIN. Cruisers. Devonshire, Dorsetshire, London, Norfolk, Shropshire, Sussex. (See pp. 301, 302, and 303.)

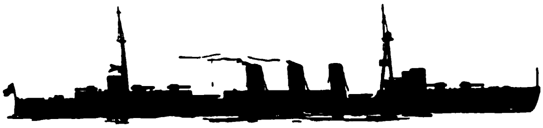


GREAT BRITAIN. Cruisers. Berwick, Cornwall, Cumberland, Kent, Suffolk. (See pp. 299, 302, and 303.)

COMMONWEALTH OF AUSTRALIA. Cruisers. Australia, Canberra. (See p. 304.)

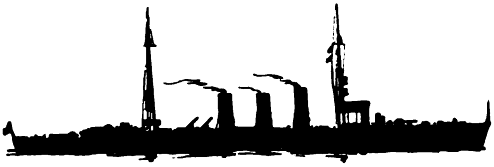


GREAT BRITAIN. Cruisers. Emerald, Enterprise. (See p. 302.)

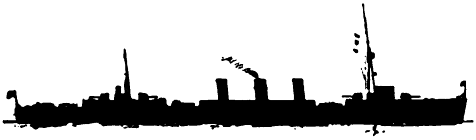


JAPAN. Light Cruisers. Kiso, Kitakami, Kuma, O-I, Tama, *Isudzu, *Natori, *Nagara, *Yura, *Kinu. (See pp. 322 and 323.)

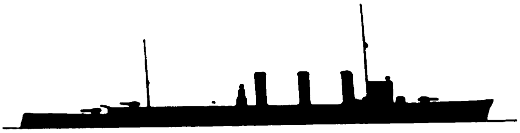
* Has aircraft hangar incorporated in bridge structure.



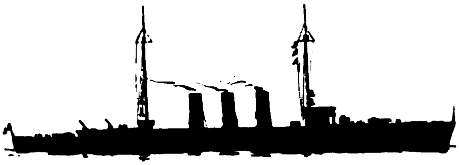
FRANCE. Light Cruiser. Metz (*ex-German*) Königsberg). (See p. 312.)



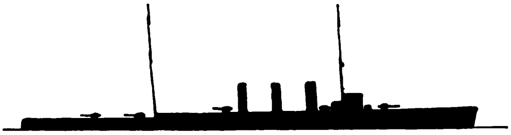
JAPAN. Light Cruisers. Tatsuta, Tenryu. (See p. 323.)



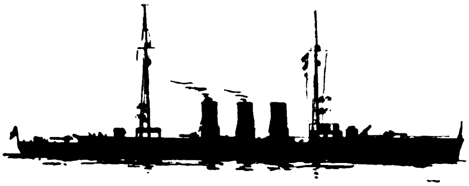
SPAIN. Light Cruisers. Don Blas Lezo, Mendez Nunez. (See p. 328.)



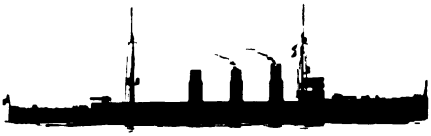
FRANCE. Light Cruiser. Strasbourg (*ex-German* Regensburg). (See p. 313.)



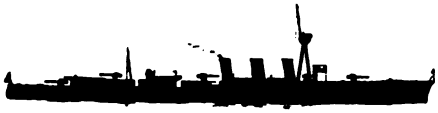
SPAIN. Light Cruiser. Reina Victoria Eugenia. (See p. 328.)



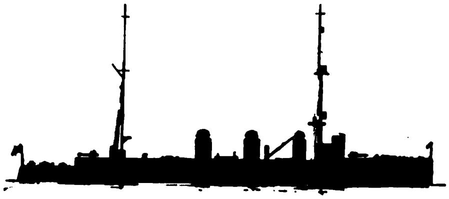
ITALY. Light Cruiser. Ancona (*ex-German* Graudenz). (See p. 319.)



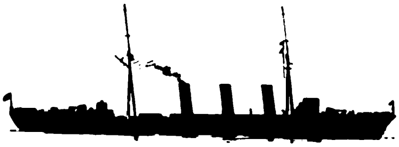
ITALY. Light Cruiser. Bari (*ex-German* Pillau). (See p. 319.)



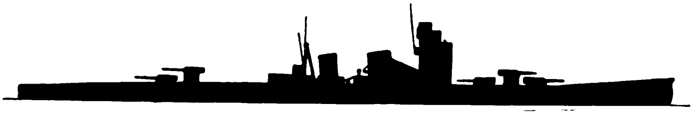
GREAT BRITAIN. Light Cruisers. Cleopatra, Carysfort, Comus. (See p. 299.)



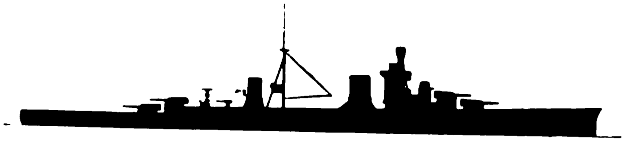
ITALY. Scout Cruiser. Quarto. (See p. 319.)



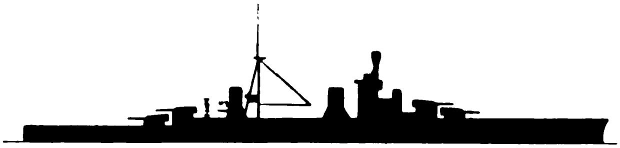
JAPAN. Second Class Cruiser. Tone. (See p. 323.)



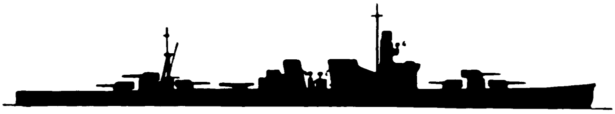
JAPAN. Cruisers. Nachi, Myoko, Ashigara, Haguro, Atago, Takao, Chokai, Maya. (See p. 322.)



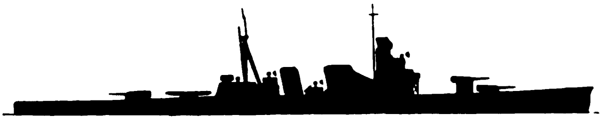
ITALY. Cruiser. Bolzano. (See p. 318.)



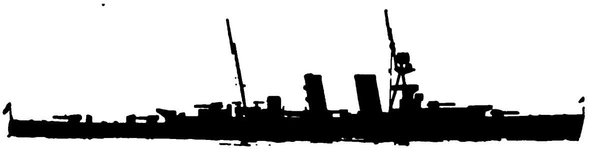
ITALY. Cruisers. Zara, Fiume, Gorizia. (See p. 318.)



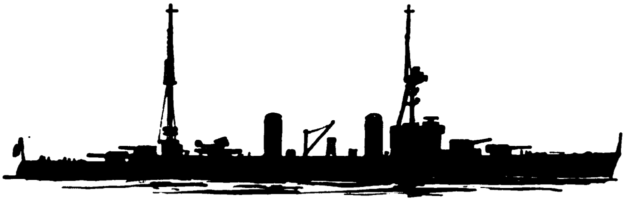
JAPAN. Cruisers. Furutaka, Kako. (See p. 322.)



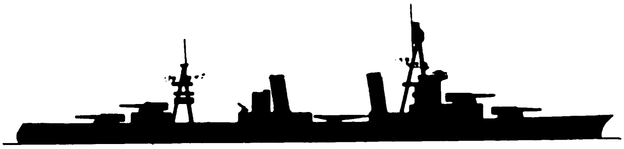
JAPAN. Cruisers. Aoba, Kinugasa. (See p. 322.)



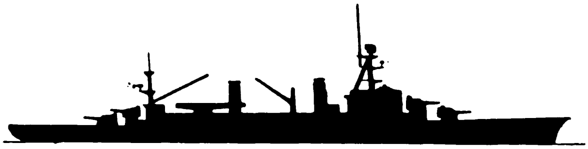
GREAT BRITAIN. Cruisers. Effingham, Frobisher, Hawkins, Vindictive. (See pp. 302 and 303.)



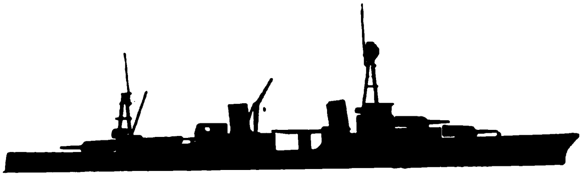
FRANCE. Cruisers. Duquesne, Tourville, Suffren, Colbert, Foch. (See p. 312.)



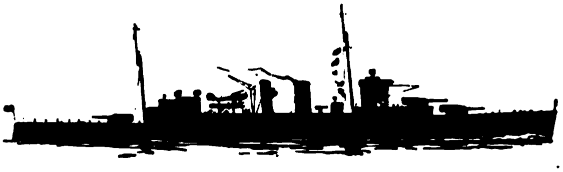
UNITED STATES Cruisers. Salt Lake City. Pensacola. (See p. 335.)



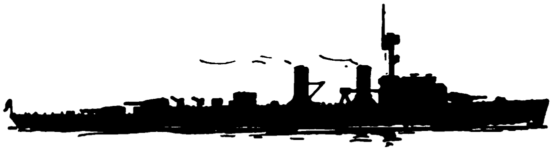
FRANCE. Training Cruiser. Jeanne d'Arc. (See p. 312.)



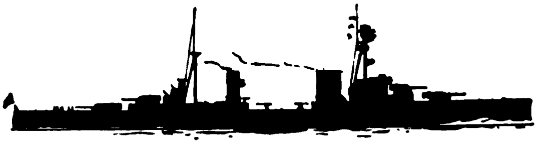
UNITED STATES. Cruisers. Northampton, Chester, Louisville, Chicago, Houston, Augusta. (See p. 334.)



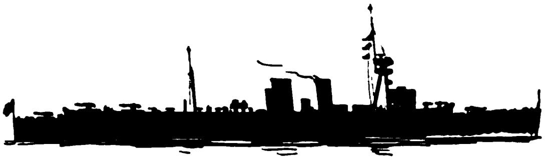
GREAT BRITAIN. Cruiser. York. (See p. 303.)



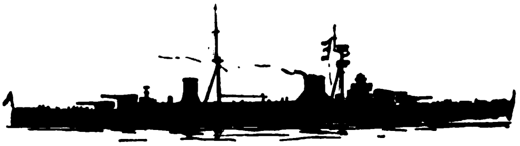
GERMANY. Light Cruisers. Köln, Karlsruhe, Konigsberg. (See p. 315.)



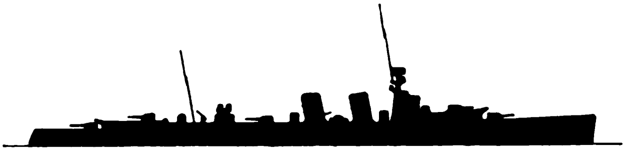
ITALY. Cruisers. Alberico de Barbiano, Alberto di Giussano Bartolomeo Colleoni, Giovanni della Bande Nere. (See p. 318.)



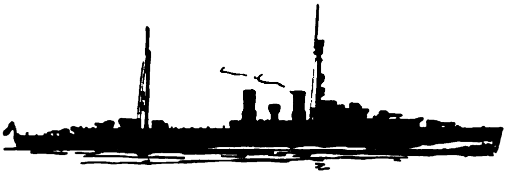
GREAT BRITAIN. Cruiser Minelayer. Adventure. (See p. 299.)



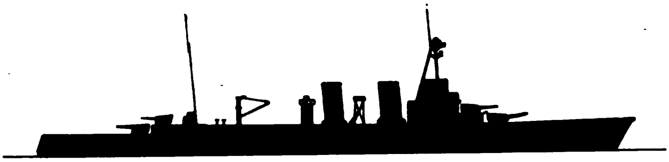
ITALY Cruisers. Trento, Trieste. (See p. 319.)



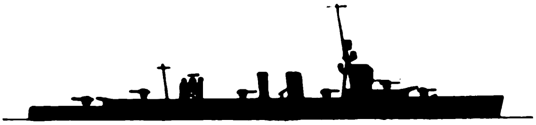
SPAIN. Light Cruisers. Principe Alfonso, Almirante Cervera, Miguel de Cervantes. (See p. 328.)



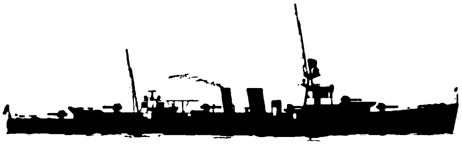
GERMANY. Light Cruiser. Emden. (See p. 315.)



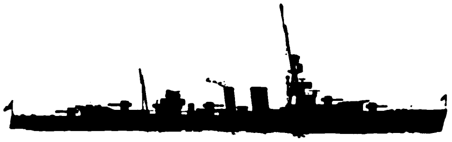
FRANCE. Cruisers. La Motte Piquet, Duguay-Trouin, Primauguet. (See p. 312.)



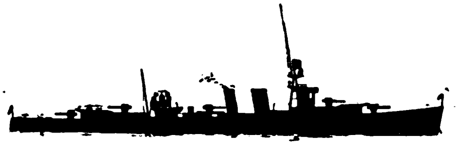
GREAT BRITAIN. Light Cruisers. Danae, Dauntless, Dragon. (See p. 301.)



GREAT BRITAIN. Light Cruisers. Delhi, Dunedin, Diomede, Despatch, Durban. (See p. 301-305.)

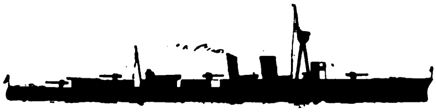


GREAT BRITAIN. Light Cruisers. Cardiff, Ceres, Coventry, Curacoa, Curlew. (See p. 301.)

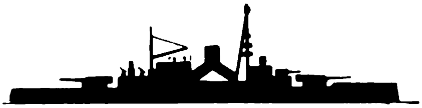


GREAT BRITAIN. Light Cruisers. Cairo, Calcutta, Capetown, Carlisle, Colombo. (See p. 300.)

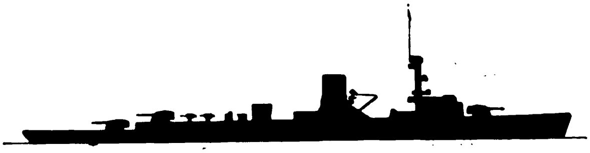
GREAT BRITAIN. Light Cruisers. Caledon, Calypso, Caradoc, Centaur, Concord. (See pp. 300 and 301.)



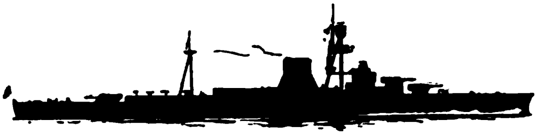
GREAT BRITAIN. Light Cruisers. Cambrian, Canterbury, Castor, Constance, Champion, Calliope. (See p. 300.)



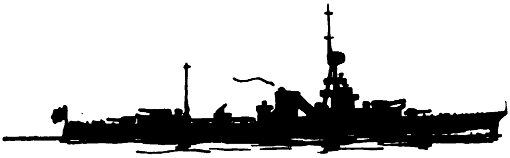
SWEDEN. Armoured Cruiser. Gustav V, Sverige. (See p. 329.)



GERMANY. **Light Cruiser.** **Leipzig.** (See p. 315.)

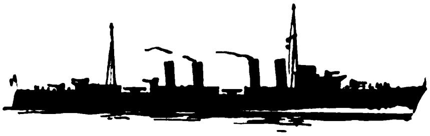


ARGENTINE. **Cruisers.** **Almirante Brown, Vintecinco de Maio.** (See p 306)

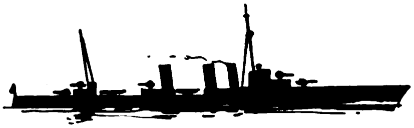


JAPAN. **Light Cruiser.** **Yubari.** (See p. 323.)

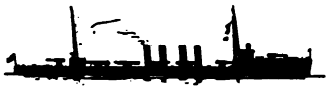
TORPEDO BOAT DESTROYERS.



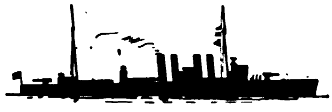
FRANCE. Flotilla Leaders. Bison, Guépard, Lion. (See p. 349.)



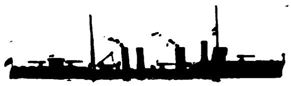
FRANCE. Flotilla Leaders. Jaguar, Panthére, Leopard, Lynx, Chacal, Tigre. (See p. 349.)



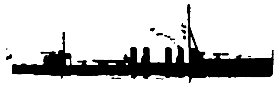
UNITED STATES. Torpedo Boat Destroyers. Aylwin, Balch, Bonham, Duncan, Parker. (See p. 363.)



UNITED STATES. Torpedo Boat Destroyer. Clemson. (See p. 362.)

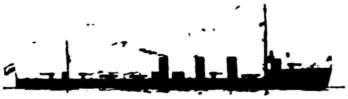


FRANCE. Torpedo Boat Destroyers. Aventurier, Intrépide, Téméraire. (See p. 350.)

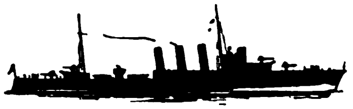


FRANCE. Torpedo Boat Destroyers. Enseigne Roux, Mécanicien Principal Lestin. (See p. 350.)

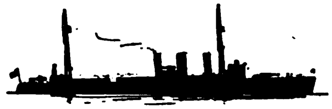
FRANCE. Torpedo Boat Destroyer. Bouclier. (See p. 350.)



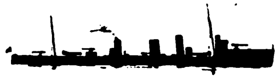
JAPAN. Torpedo Boat Destroyer. Amatsukaze. (See p. 355.)



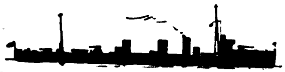
FRANCE. Torpedo Boat Destroyers, Bourrasque, Orage, Ouragan, Simoun. (See p. 349.)



UNITED STATES. Torpedo Boat Destroyer. Caldwell. (See p. 363.)

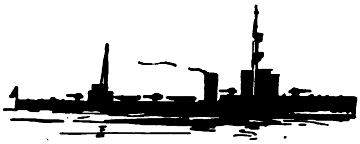


FRANCE. Torpedo Boat Destroyers. Algérien, Annamite, Arabe, Bambara, Hova, Kabyle, Marocain, Sakalave, Sénégalais, Somali, Tonkinois, Touareg. (See p. 350.)



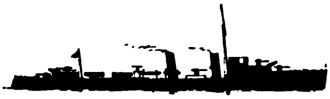
JAPAN. Torpedo Boat Destroyer. Kaba. (See p. 355.)

ITALY. Torpedo Boat Destroyers. Angelo Bassini, E. Cosenz, Francesco Stocco, Giacinto Carini, Giacoma Medici, Giovanni Acerbi, Giuseppe la Farina, Giuseppe la Masa, Giuseppe Sirtori, Nicola Fabrizi, Vincenzo Orsini. (See p. 353.)

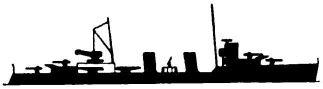


ITALY. Flotilla Leaders. Leone, Pantera, Tigere. (See p. 353.)

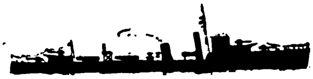
ITALY. Torpedo Boat Destroyer. Carlo Mirabello. (See p. 353.)



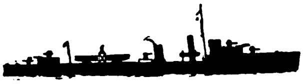
GREAT BRITAIN. Torpedo Boat Destroyer. Broke. (See p. 341.)



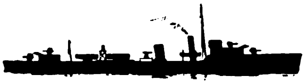
HOLLAND. Destroyers. De Ruyter, Evertsen, Piet Hein, Kortenaer. (See p. 357.)



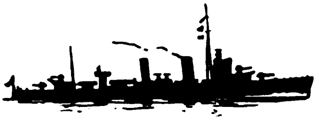
GREAT BRITAIN. Torpedo Boat Destroyers. Vansittart, Venomous, Verity, Volunteer, Wanderer, Whitehall, Whitshed, Wild Swan, Wishart, Witch, Wren. (See p. 342.)



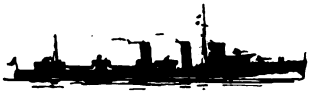
GREAT BRITAIN. Torpedo Boat Destroyers. Vanessa, Vanity, Vanoc, Vanquisher, Vectis, Vega, Velox, Vendetta, Venetia, Venturous, Verdun, Versatile, Vesper, Vidette, Vimiera, Violent, Vivacious, Vivien, Vimy (*late* Vancouver), Vortigern, Valhalla, Valentine, Valkyrie, Valorous, Vampire. (See p. 343.)



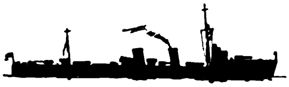
GREAT BRITAIN. Torpedo Boat Destroyers. Viceroy, Viscount, Voyager, Wakeful, Walker, Walpole, Walrus, Warwick, Watchman, Waterhen, Wessex, Westcott, Westminster, Whirlwind, Whitley, Winchelsea, Winchester, Wolfhound, Wolsey, Woolston, Wrestler, Wryneck. (See pp. 342 & 343.)



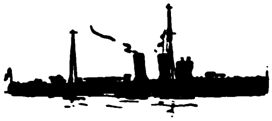
GREAT BRITAIN. Destroyers. Ambuscade, Amazon. (See p. 341.)



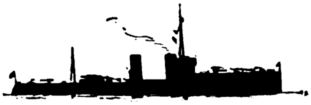
CHILE. Destroyers. Serrano, Orella, Riquelme, Hyatt, Vidella, Aldea. (See p. 348.)



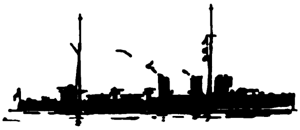
JAPAN. Torpedo Boat Destroyer. Momo. (See p. 356.)



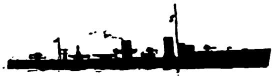
ITALY. Torpedo Boat Destroyer. Quintino Sella. (See p. 353.)



ITALY. Torpedo Boat Destroyer. Alessandro Poerio. (See p. 353.)

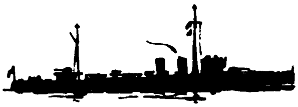


ITALY. Torpedo Boat Destroyer. Nazario Sauro. (See p. 333.)



GREAT BRITAIN. Torpedo Boat Destroyers. Shikari, Simoom, Tasmania, Tattoo. (See p. 342.)

ITALY. Torpedo Boat Destroyer. Palestro. (See p. 354.)



ITALY. Torpedo Boat Destroyer. Turbine. (See p. 353.)

PLANS

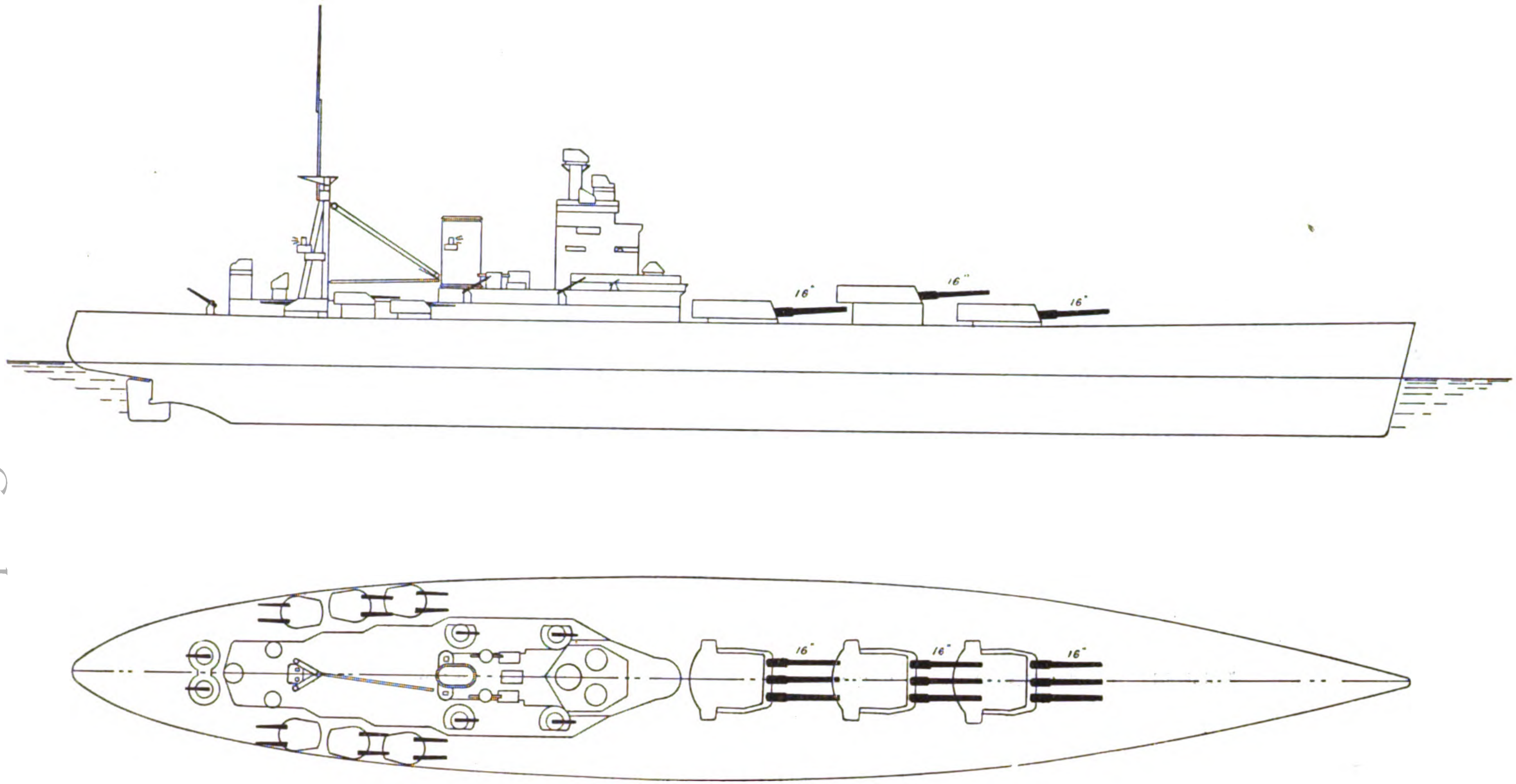
OF

BRITISH AND FOREIGN WARSHIPS.

GREAT BRITAIN.

BATTLESHIPS.

Nelson. **Rodney.**

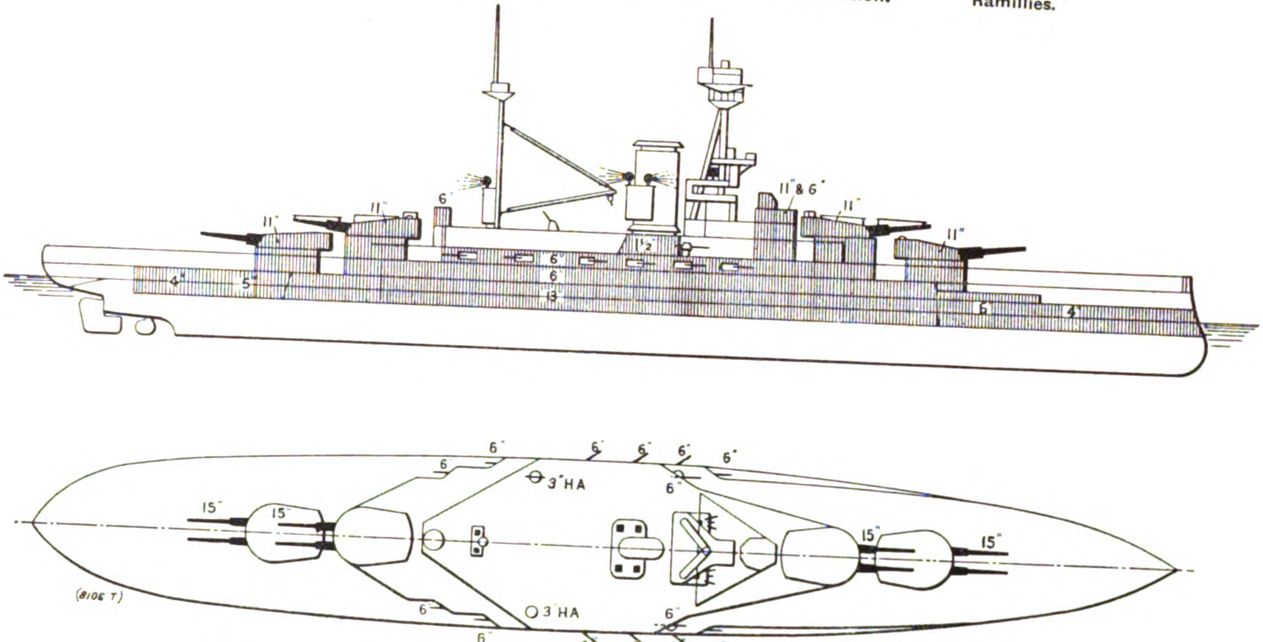


Length (extreme), 710 ft.; 33,500 tons; Speed, 23 knots.
Armament, 9—16-in.; 12—6-in.; 6—4·7-in. A.A.; 4—3-pr.; 8—2-pr. Pom Poms; 10 L.; 5 M.

GREAT BRITAIN.

BATTLESHIPS.

Royal Sovereign. **Royal Oak.** **Revenge.** **Resolution.** **Ramillies.**



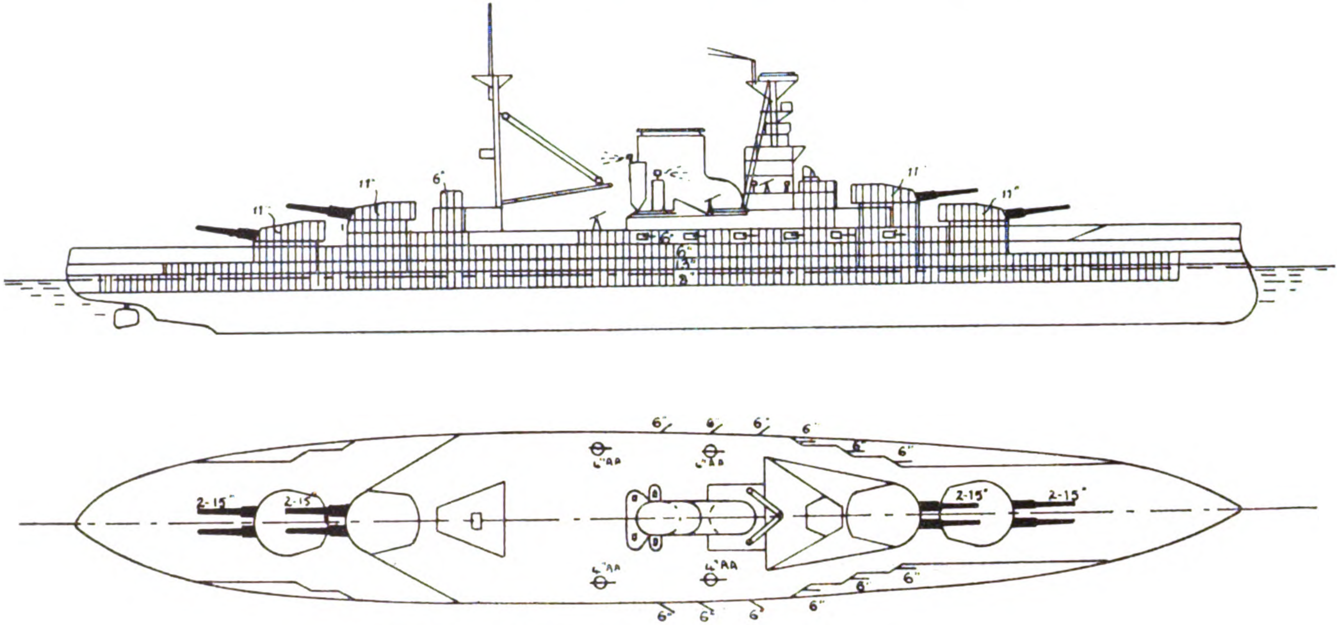
Length (extreme), 620 ft. 6 ins.* ; Length B.P., 580 ft. ; 29,150 tons ; Speed, 23 knots ; Completed, 1916-17.
Armament, 8—15 in. ; 14—6 in. ; 2—4-in. A.A. ; 4—3-pr. ; 5 M ; 10 L.
Searchlights on mainmast removed.

* **Revenge, 625 ft. 9 in.**

GREAT BRITAIN.

BATTLESHIPS.

Queen Elizabeth. Warspite. Barham. Valiant. Malaya.

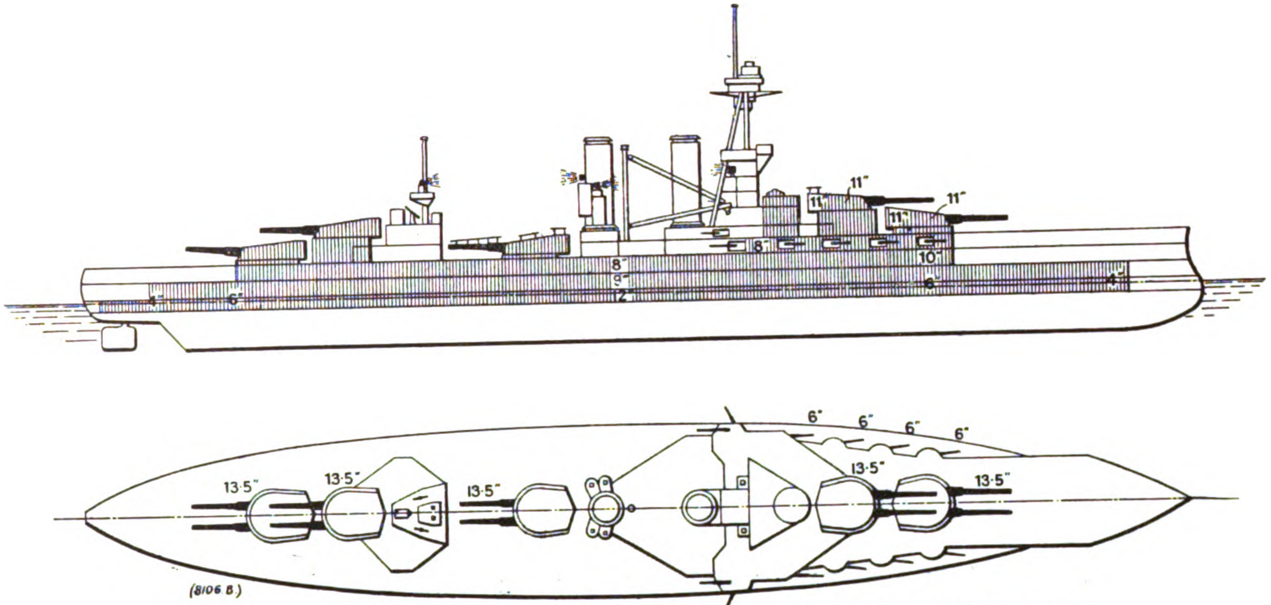


Length B.P., 600 ft.; 31,100 tons; Speed, 25 knots; Completed, 1915-1916.
Armament, 8—15-in.; 12—6-in.; 4—4-in. A.A.; 4—3-pr.; 5 M.; 10 L.

GREAT BRITAIN.

BATTLESHIPS.

Iron Duke. **Marlborough.** **Emperor of India.**



Length (extreme), 623 ft. 9 ins.*; Length B.P., 580 ft.; 26,250 tons; Speed, 21 knots; Completed, 1914.
Armament, 10—13·5-in.; 12—6-in.; 2—3-in. H.A.; 4—3-pr.; 5 M; 10 L.

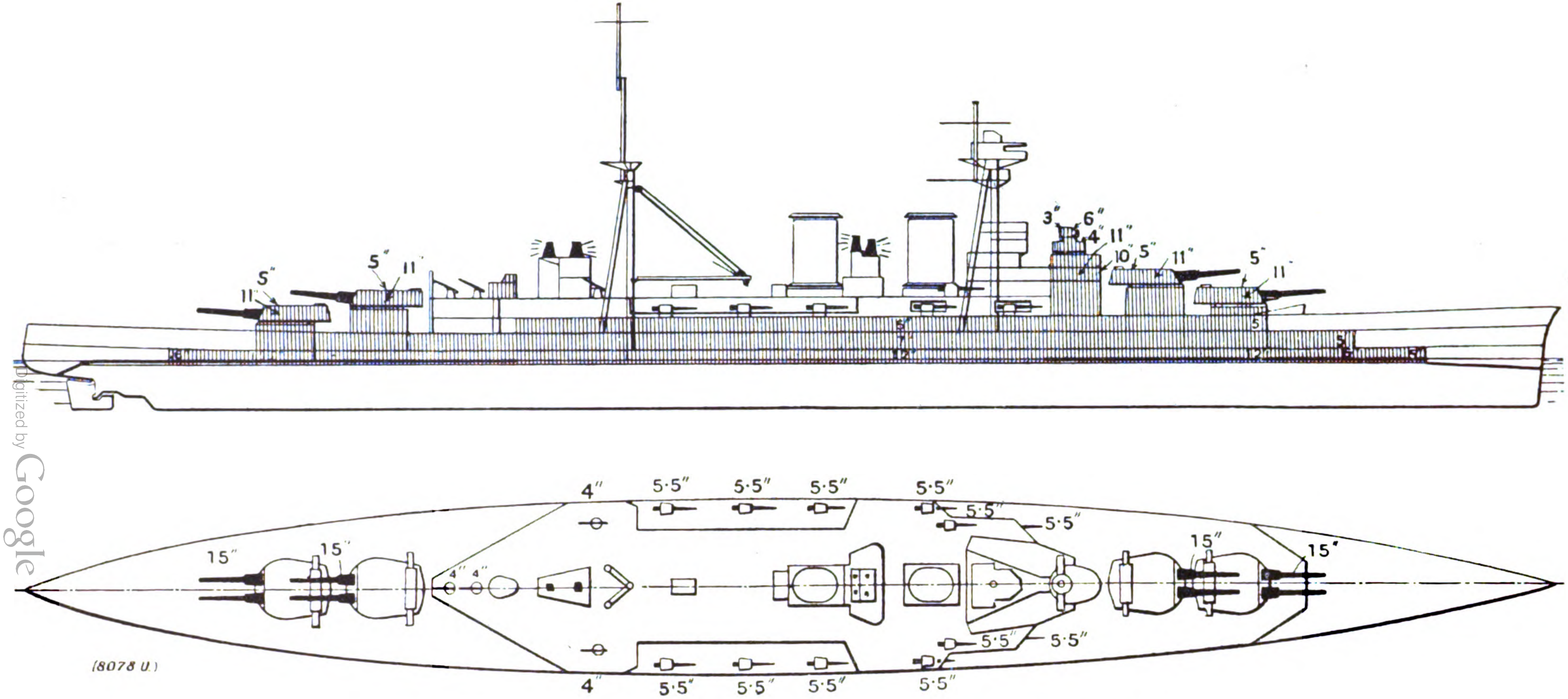
* Marlborough, 623 ft.; Emperor of India, 624 ft. 7 ins.

Iron Duke is to be converted to a training-ship, and the remaining two vessels of the class are to be disposed of in accordance with the London Naval Treaty.

GREAT BRITAIN.

BATTLE-CRUISER.

Hood.



(8078 U.)

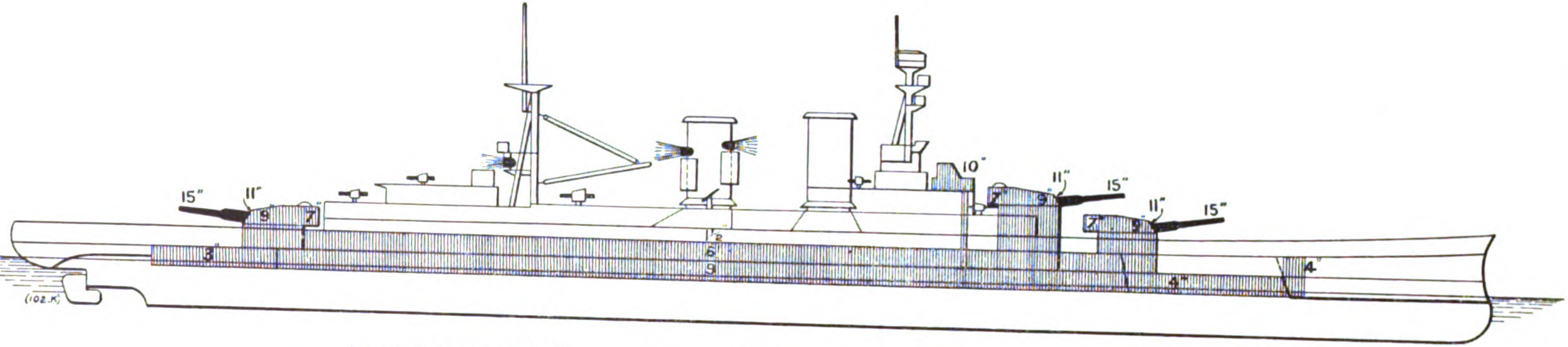
Length (extreme), 860 ft. 10 ins.; Length B.P., 810 ft.; 42,100 tons; Speed, 31* knots; Completed, 1920.
Armament, 8—15-in.; 12—5·5-in.; 4—4-in A.A.; 4—3-pdr.; 5 M.; 10 L.

* Trials at 44,600 tons, 31·89 knots with 151,000 S.H.P.

GREAT BRITAIN.

BATTLE-CRUISERS.

Repulse. **Renown.**



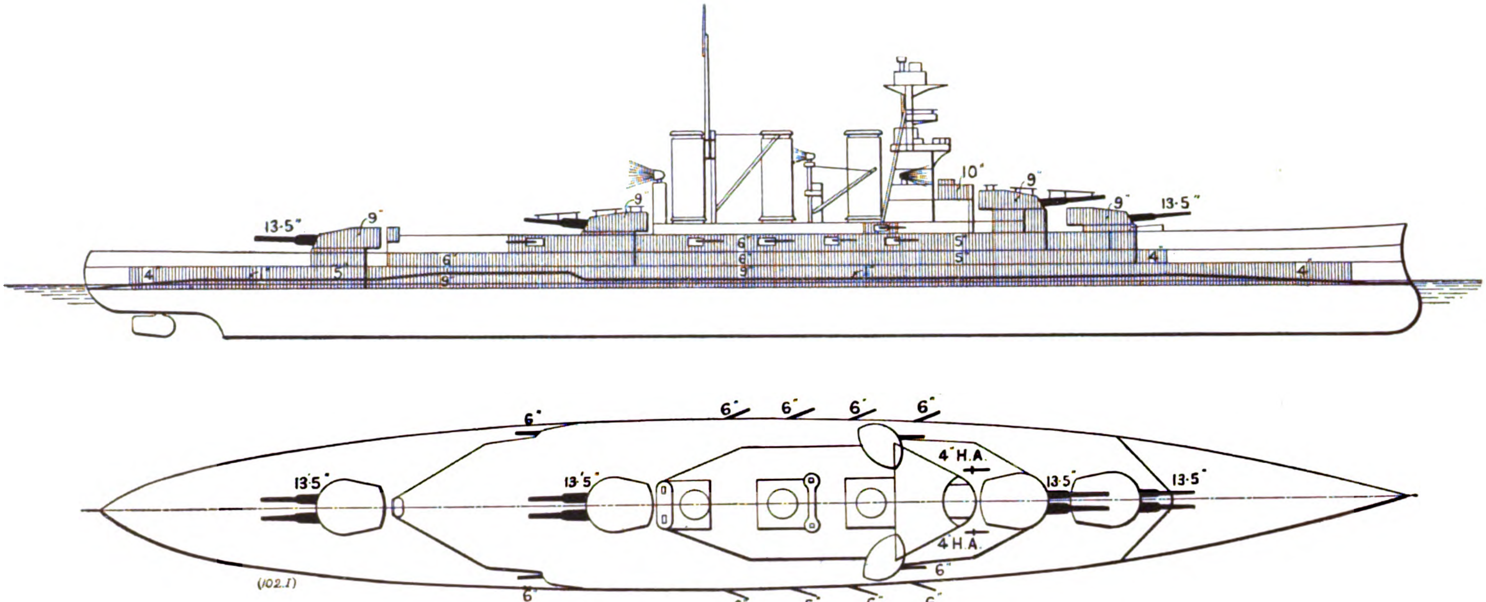
Length (extreme), 794 ft. 2 ins. ; Length B.P., 750 ft. ; 32,000 tons ; Speed, 31·5 knots ; Completed, 1916.
Armament, 6—15-in. ; 15—4-in. ; 4—3-pr. ; 4—4-in. A.A. ; 5 M. ; 10 L.

NOTE.—Repulse originally had a 6-in. main belt, but was re-armoured in 1920–21. Re-armouring of the Renown was completed during 1926.

GREAT BRITAIN.

BATTLE-CRUISER

Tiger.



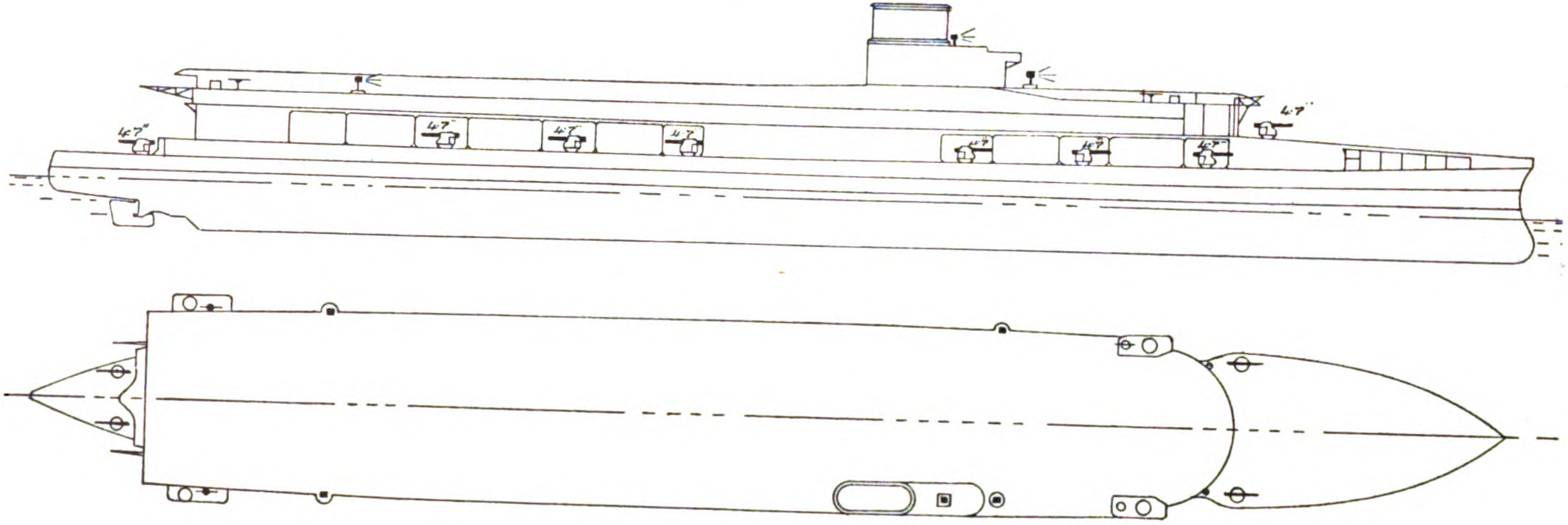
Length (extreme), 702 ft.; Length B.P., 660 ft.; 28,900 tons; Speed, 30 knots; Completed, 1914.
Armament, 8—13·5-in.; 12—6-in.; 4—3-pr.; 4—3-in. A.A.; 5 M.; 10 L.

Tiger is to be disposed of in accordance with the London Naval Treaty.

GREAT BRITAIN.

AIRCRAFT CARRIERS.

Courageous. **Glorious.**

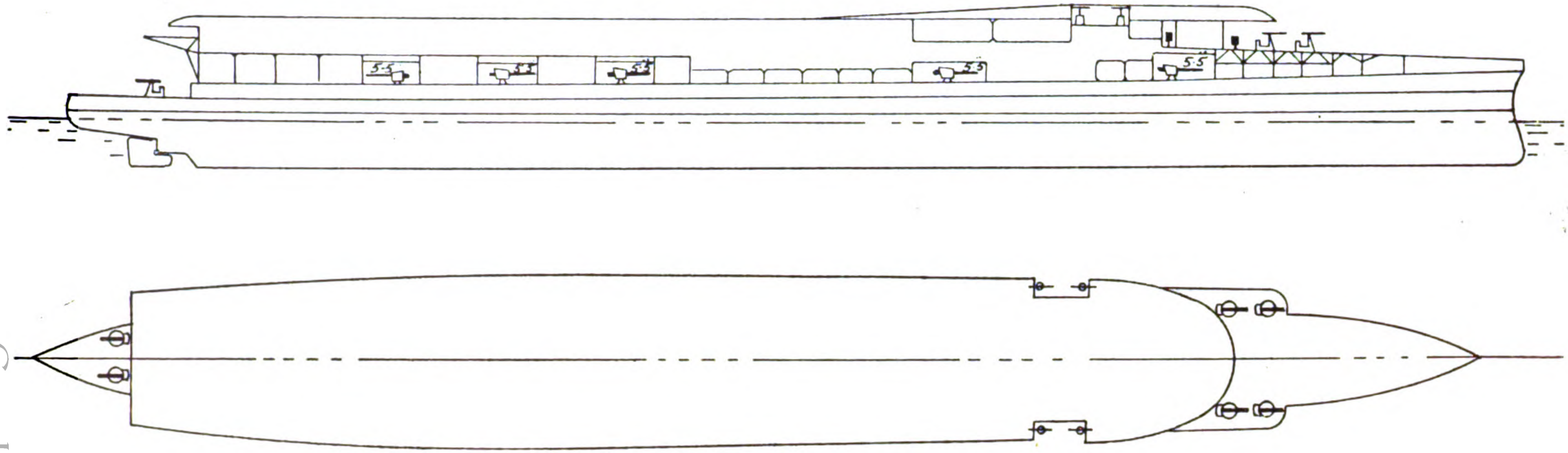


Length (extreme), 786 ft. 6 ins.; 22,500 tons; Speed, 31 knots.
Armament, 16—4·7-in.; 4—3-pr.; 4—2-pr.; 4 M.; 42 L.

GREAT BRITAIN.

AIRCRAFT CARRIER.

Furious.

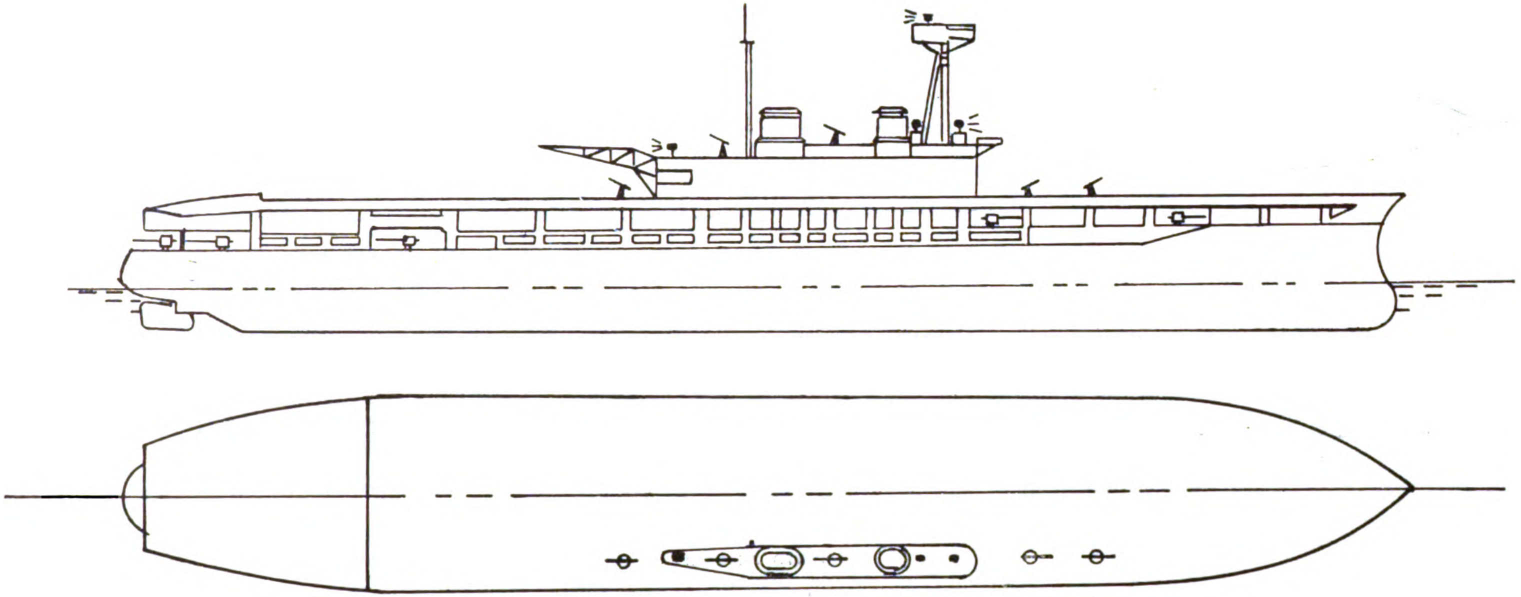


Length (extreme), 786 ft. 6 ins.; 22,450 tons; Speed, 31 knots; Completed, 1917.
Armament, 10—5·5-in.; 6—4-in. A.A.; 4—3-pr.; 4—2-pr.; 4 M.; 10 L.

GREAT BRITAIN.

AIRCRAFT CARRIER.

Eagle.

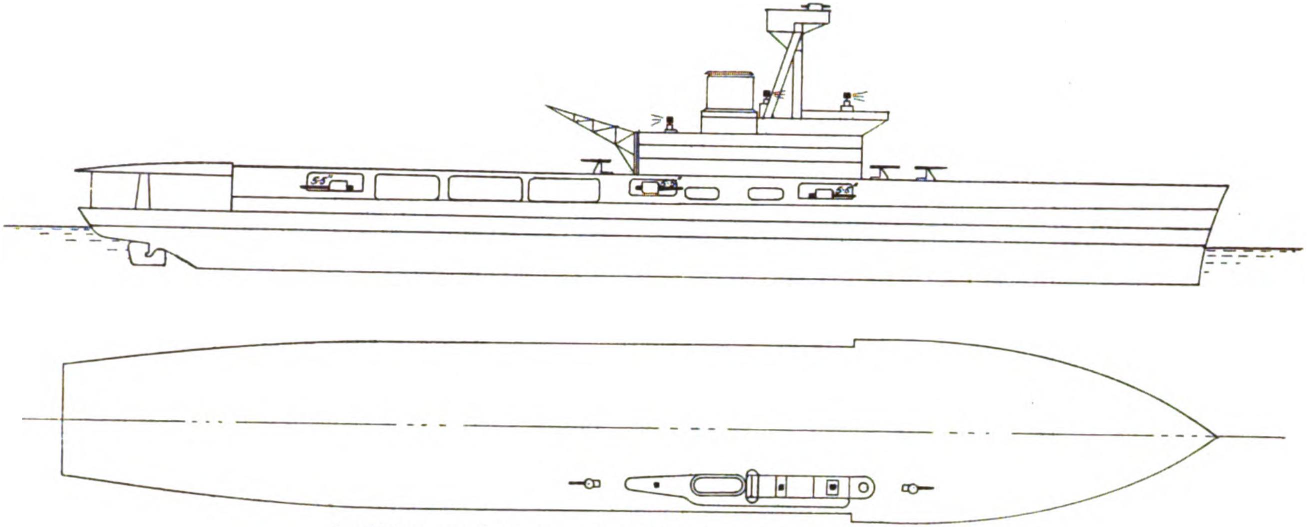


Length (extreme), 667 ft. 6 ins.; 22,600 tons; Speed, 24 knots.
Armament, 9—6-in.; 5—4-in. A.A.; 4—3-pr.; 4 M.; 26 L.

GREAT BRITAIN.

AIRCRAFT CARRIER.

Hermes.

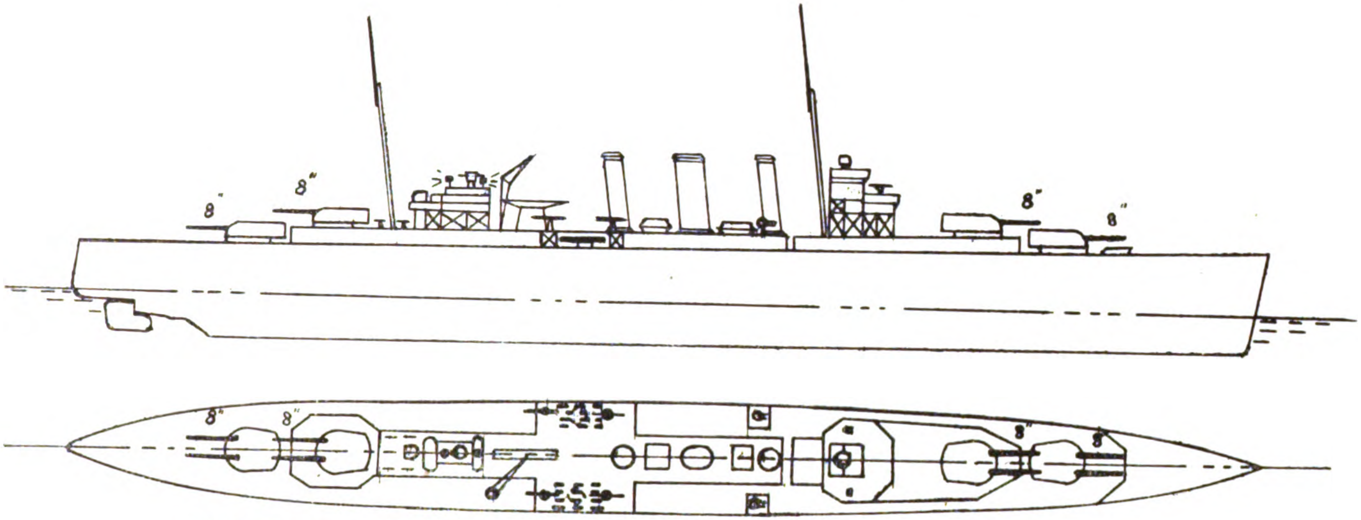


Length (extreme), 599 ft. 6 ins.; 10,850 tons; Speed, 25 knots; Completed 1924.
Armament, 6—5·5-in.; 3—4-in. A.A.; 4—3-pr.; 2—2-pr.; 4 M.; 10 L.

GREAT BRITAIN.

CRUISERS.

London. Sussex. Shropshire. Devonshire. Dorsetshire.* Norfolk.*



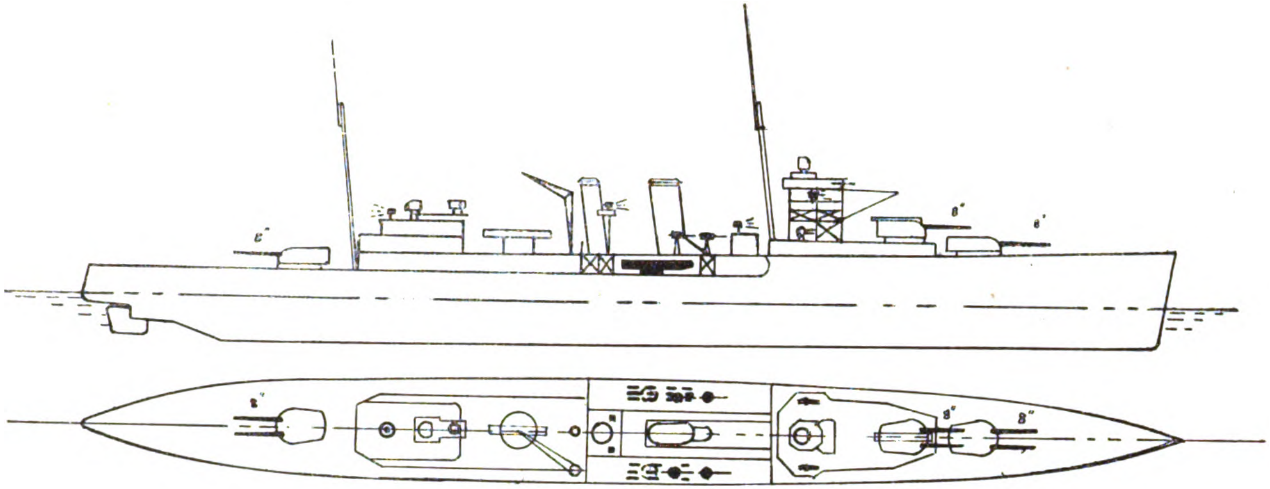
Displacement, 10,000 tons ; Length (extreme), 630 ft. Armament, 8—8-in. ; 4—4-in. A.A. ; 4—3-pr. ; 4—2-pr. ; 4 M. ; 8 L.

* In Dorsetshire and Norfolk the seaplane crane and the 4—4-in. guns are slightly forward of the positions shown.

GREAT BRITAIN

CRUISERS.

York. Exeter.*



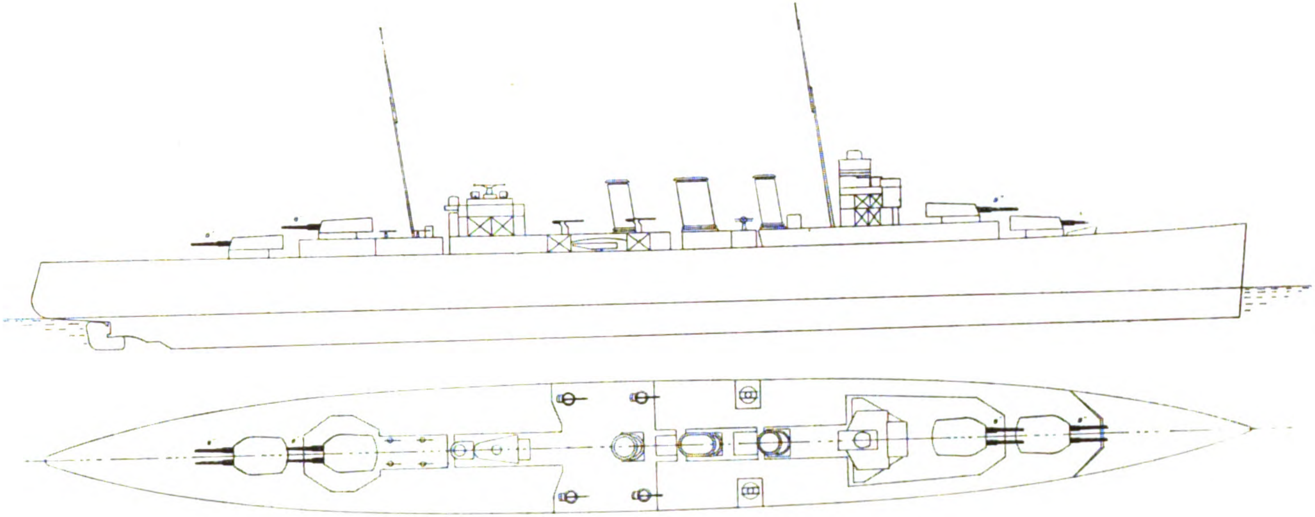
Displacement 8,400 tons : Length (extreme), 575 ft. Armament, 6—8-in. ; 4—4-in. A A. ; 4—3-pr. ; 2—2-pr. ; 4 M ; 8 L.

* In Exeter funnels and masts are vertical.

GREAT BRITAIN.

CRUISERS.

Kent. Berwick. Cumberland. Suffolk. Cornwall. Australia Canberra



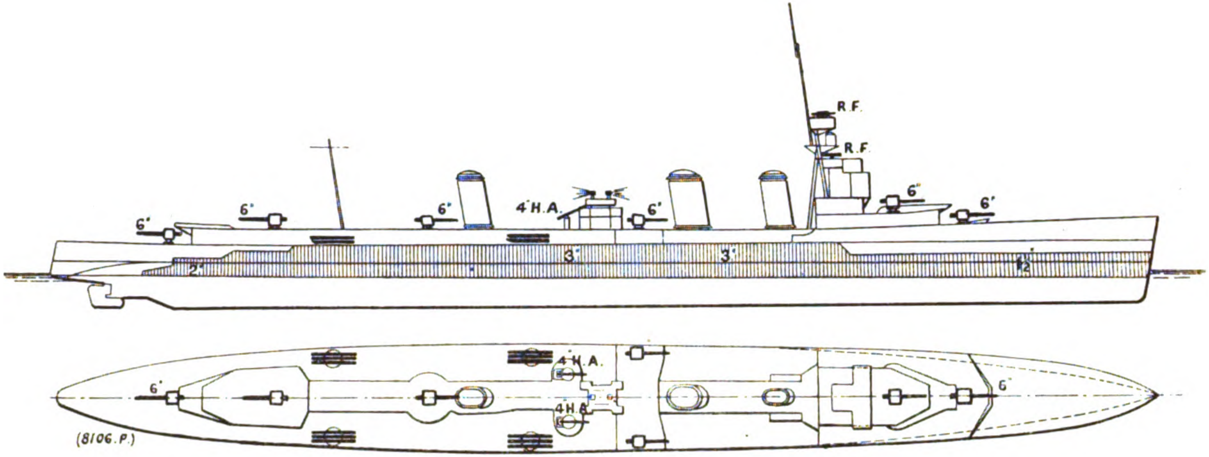
Length (extreme), 630 ft. ; B.P., 590 ft. ; 10,000 tons ; Speed, 32 knots.
Armament, 8—8-in. ; 4—4-in. A.A. ; 4—3-pr. ; 4—2-pr. Pom Poms ; 4 M. ; 8 L. ; 2 Q.R. torpedo tubes.

* H.M. Australian Navy.

GREAT BRITAIN.

LIGHT CRUISERS.

Emerald. **Enterprise.***



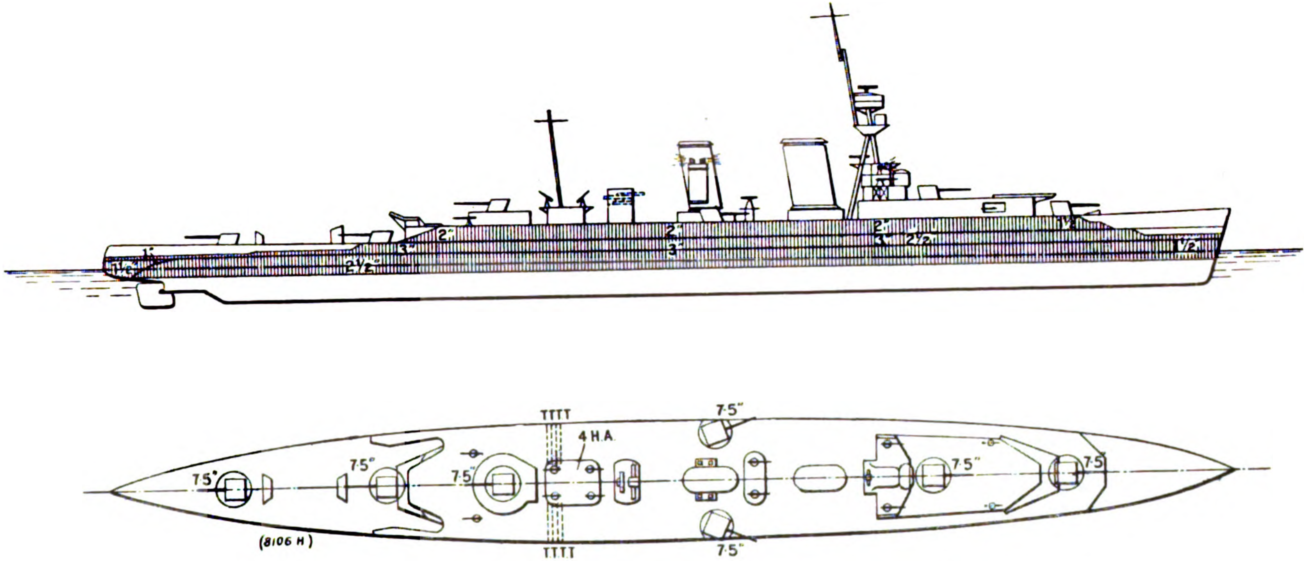
Length (extreme), 570 ft. ; Length B.P., 535 ft. ; 7,100 tons ; Speed, 33 knots.
Armament, 7—6-in. ; 3—4-in. A.A. ; 4—3-pr. ; 2—2-pr. Pom Poms ; 2 M. ; 8 L.

* In Enterprise the two forward 6-in. guns are mounted in a twin-mounting on forecastle deck.

GREAT BRITAIN.

LIGHT CRUISERS.

Effingham. **Hawkins.** **Frobisher.** **Vindictive.***



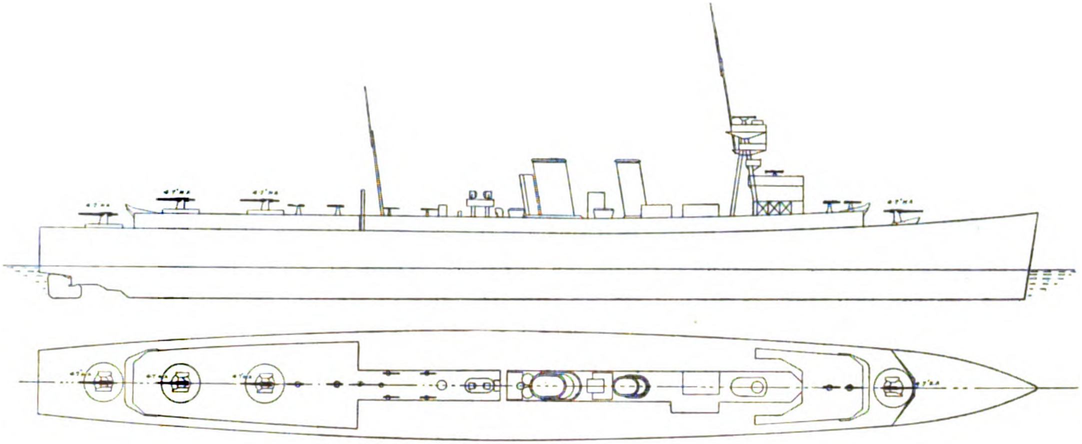
Length (extreme), 605 ft.; Length B.P., 565 ft.; 9,860 tons; Speed, 30 knots.
Armament, 7—7·5-in.; 3—4-in. A.A.; 4—3-pr.; 2 M.; 8 L.
Hawkins has 4—4-in. A.A. and two 2-pr. Pom Poms.

* **Vindictive has a catapult mounted forward of the bridge, and to accommodate this the raised 7·5-in. gun forward has been removed.**

GREAT BRITAIN

CRUISER MINELAYER

Adventure.

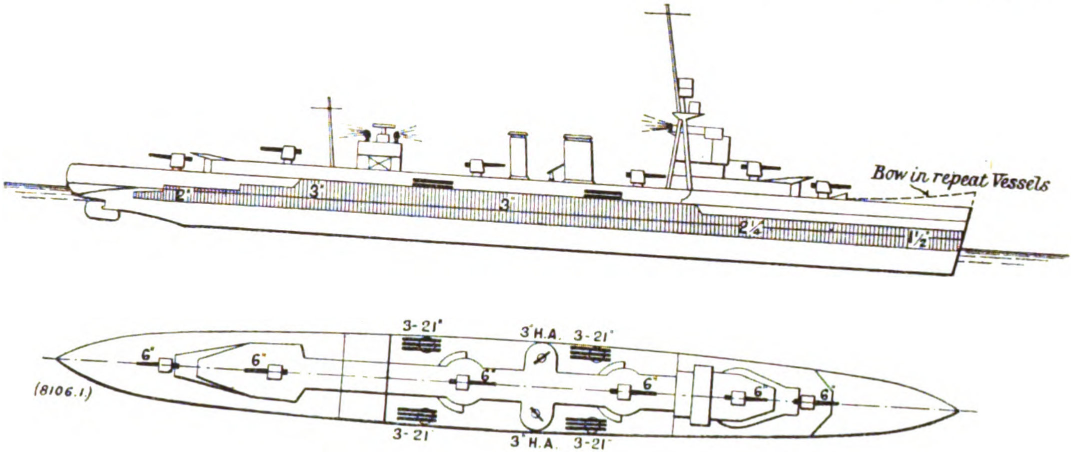


Length (extreme), 521 ft.; Length, B.P., 500 ft.; 6,740 tons; Speed, 27¾ knots.
Armament, 4—4·7-in. A.A.; 4—3-pr.; 2 M.; 8 L.

GREAT BRITAIN.

LIGHT CRUISERS. D CLASS.

*Despatch. *Diomede. Danae. Dauntless. Dragon. *Delhi. *Dunedin. *Durban.



Length, 445 ft. ; 4,850 tons ; Speed, 29 knots ;
Armament, 6—6-in. ; 3—4-in. A.A. ; 4—3-pr. ; 2 M. ; 8 L.

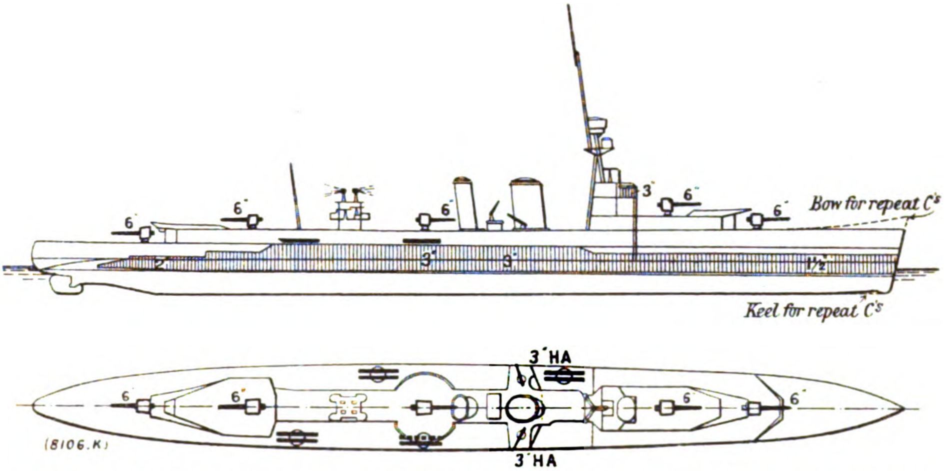
Diomede and Dunedin are now attached to the New Zealand Division.

* Repeat vessels.

GREAT BRITAIN.

LIGHT CRUISERS.

Ceres. ***Cairo.** **Curacoa.** ***Cape Town.** **Curlew.** ***Carlisle.** **Cardiff.** ***Colombo.** **Coventry.** ***Calcutta.**

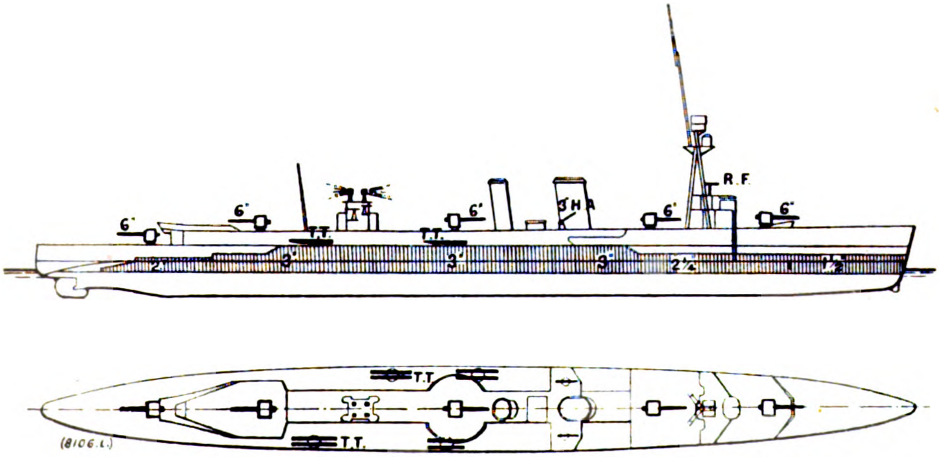


Length (extreme), 450 ft. (451 ft. 6 ins. Repeat Vessels); Length B.P., 425 ft.; 4,290 tons; Repeat vessels, 4,200 tons; Speed, 29 knots; Completed, 1917–18 (Repeat Vessels, 1918–22).
Armament, 5—6-in.; 2—3-in. A.A.; 4—3-pr.; 2—2-pr. Pom Poms; 4 above-water D.R. torpedo tubes.
Cardiff has 2—3-pr.

* Repeat vessels.

LIGHT CRUISERS.

Caledon. **Centaur.** **Calypso.** **Concord.** **Caradoc.**



These Plans apply to the above-named ships, but there are differences in detail, as stated below.

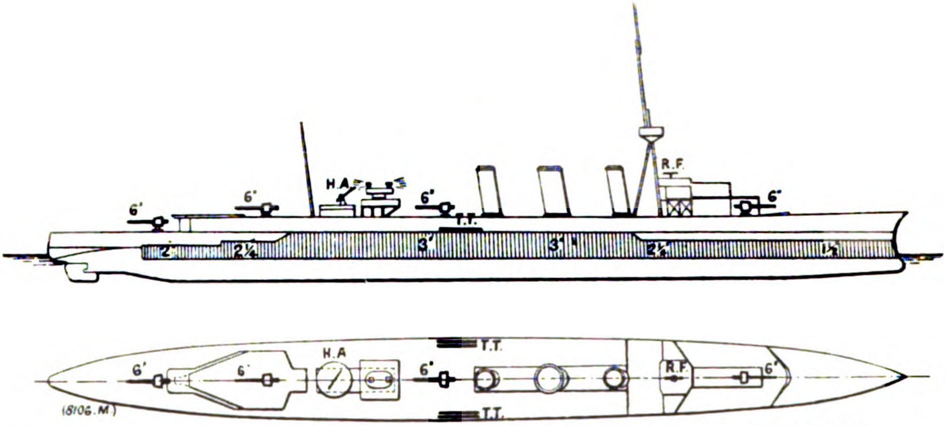
Caledon } **Calypso** } **Caradoc** } Length (extreme), 450 ft.; Length B.P., 425 ft.; 4,180 tons; Speed, 29 knots; Completed, 1917.
Armament, 5—6-in.; 2—3-in. A.A.; 4—3-pr.; 2—2-pr. Pom Poms; 2 M.; 8 L.; and 4 above-water D.R. torpedo tubes.

Centaur } **Concord** } Length (extreme), 446 ft.; Length B.P., 420 ft.; 4,120 tons; Speed, 29 knots; Completed, 1916.
Armament, 5—6-in. (Centaur 4—6-in.); 2—3-in. H.A.; 2—3-pr.; 2—2-pr. Pom Poms; 2 M.; 4 L.; and 2 submerged torpedo tubes.

GREAT BRITAIN.

LIGHT CRUISERS.

Carysfort. **Cleopatra.** **Comus**

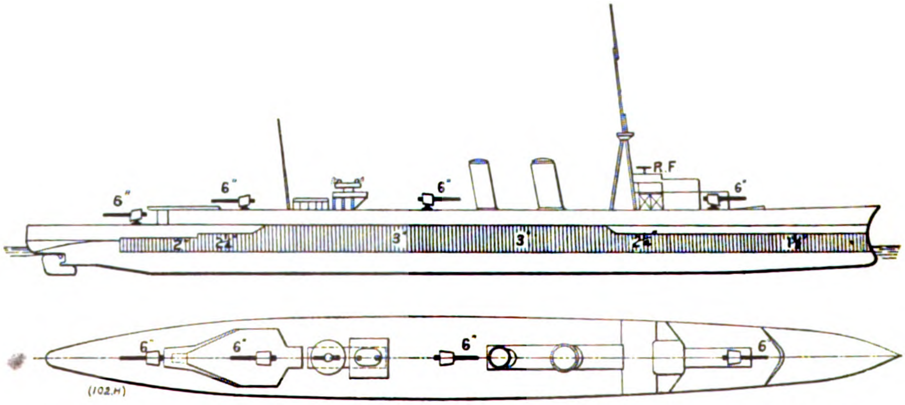


Carysfort
Cleopatra
Comus

Length (extreme), 446 ft.; Length B.P., 420 ft.; 3,895 tons; Speed, 29 knots; Completed, 1915.
Armament, 4—6-in.; 2—3-in. A.A.; 4—3-pr.; 2—2-pr. Pom Poms; 1 M.; 8 L.; 2 above-water D.R. torpedo tubes.

LIGHT CRUISERS.

Cambrian. **Canterbury.** **Constance.** **Castor.** **Champion.** **Calliope.**



Length (extreme), 446 ft. 6 ins.; Length B.P., 420 ft.; 3,920 tons; Speed, 29 knots; Completed, 1915.

Cambrian
Canterbury
Constance
Castor

Armament, 4—6-in.; 2—3-in. A.A.; 4—3-pr.; 2—2-pr. Pom Poms; 1 M.; 8 L.; 2 submerged torpedo tubes.

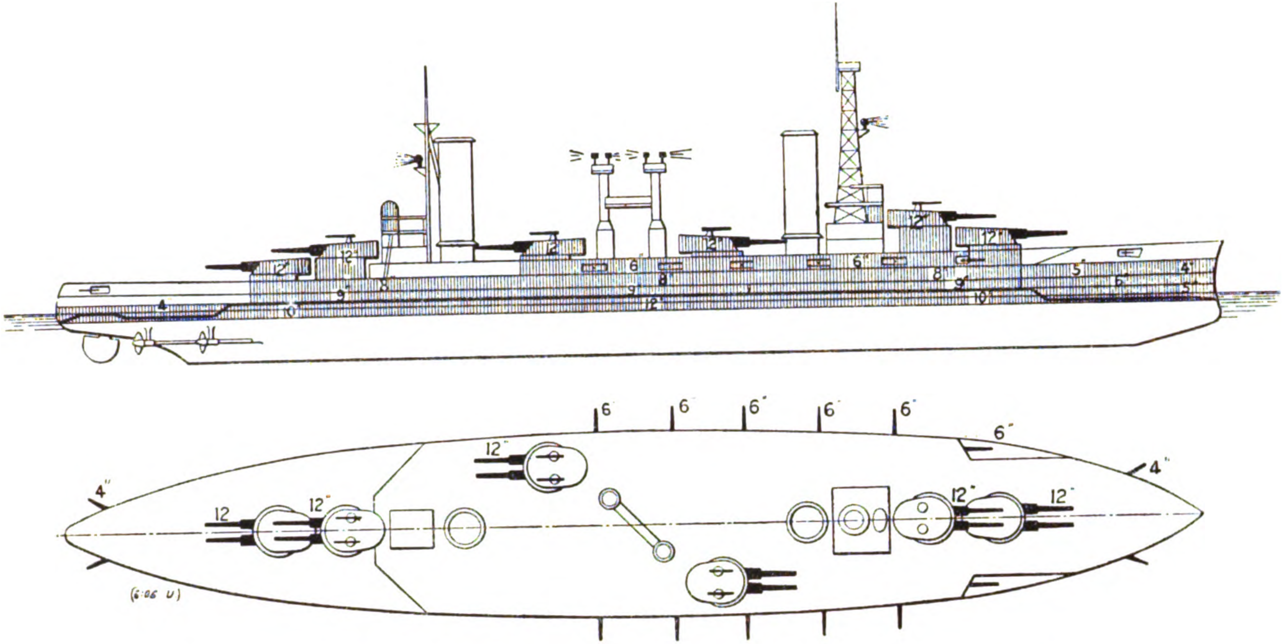
Champion Armament, 4—6-in.; 1—3-in. A.A.; 2—2-pr. Pom Poms; 1 M.; 8 L.; 2 submerged torpedo tubes; 2 above-water torpedo tubes.

Calliope Armament, 4—6-in.; 2—3-in. A.A.; 4—3-pr. 2—2-pr. Pom Poms; 1 M.; 8 L.; 2 submerged torpedo tubes.

ARGENTINE.

BATTLESHIPS.

Moreno. **Rivadavia.**

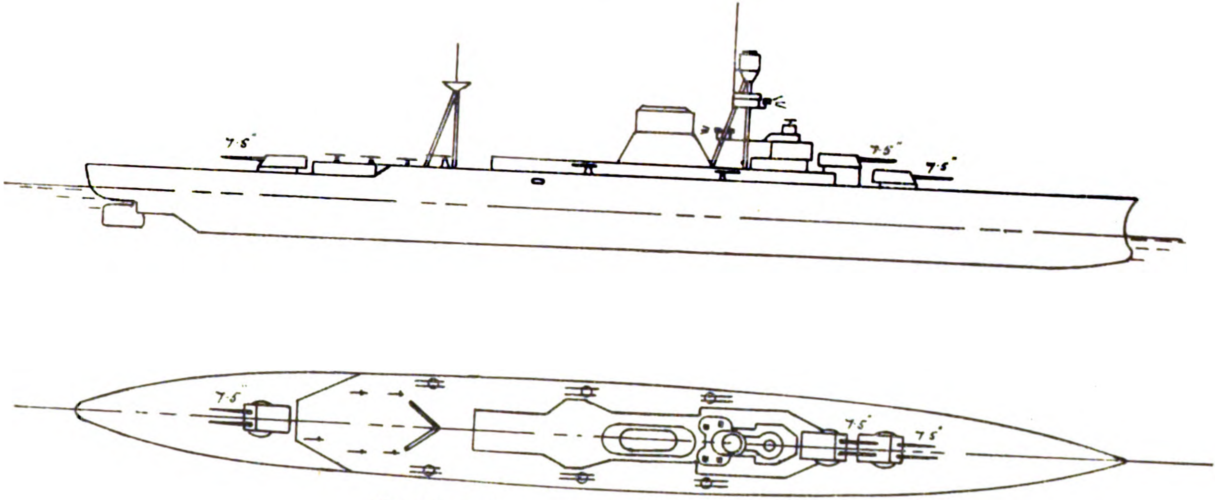


Length (extreme), 585 ft. ; Length on W.L., 575 ft. ; 27,940 tons ; Speed, 22 knots ; Completed, 1914-15.
Armament, 12—12-in. ; 12—6-in. ; 4—3-in. A.A. ; 4—3-pr.

ARGENTINE.

CRUISERS.

Almirante Brown. **25 Maio.**

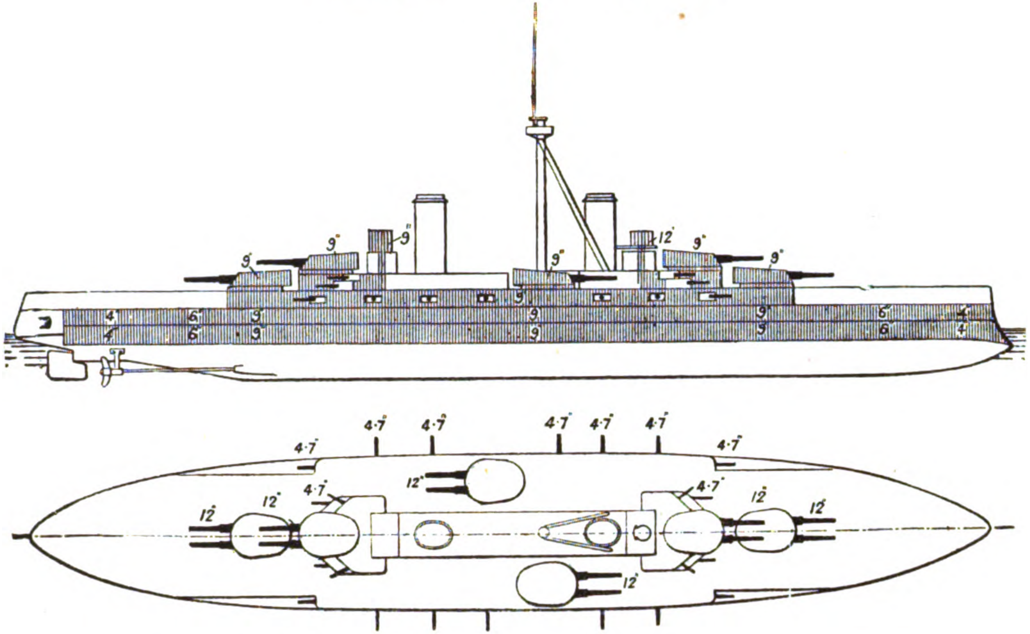


Length (waterline), 546 ft.; 6,495 tons; Speed, 32 knots.
Armament, 6—7·5-in. 12—4-in. A.A.

BRAZIL.

BATTLESHIPS.

Minas Geraes. **São Paulo.**



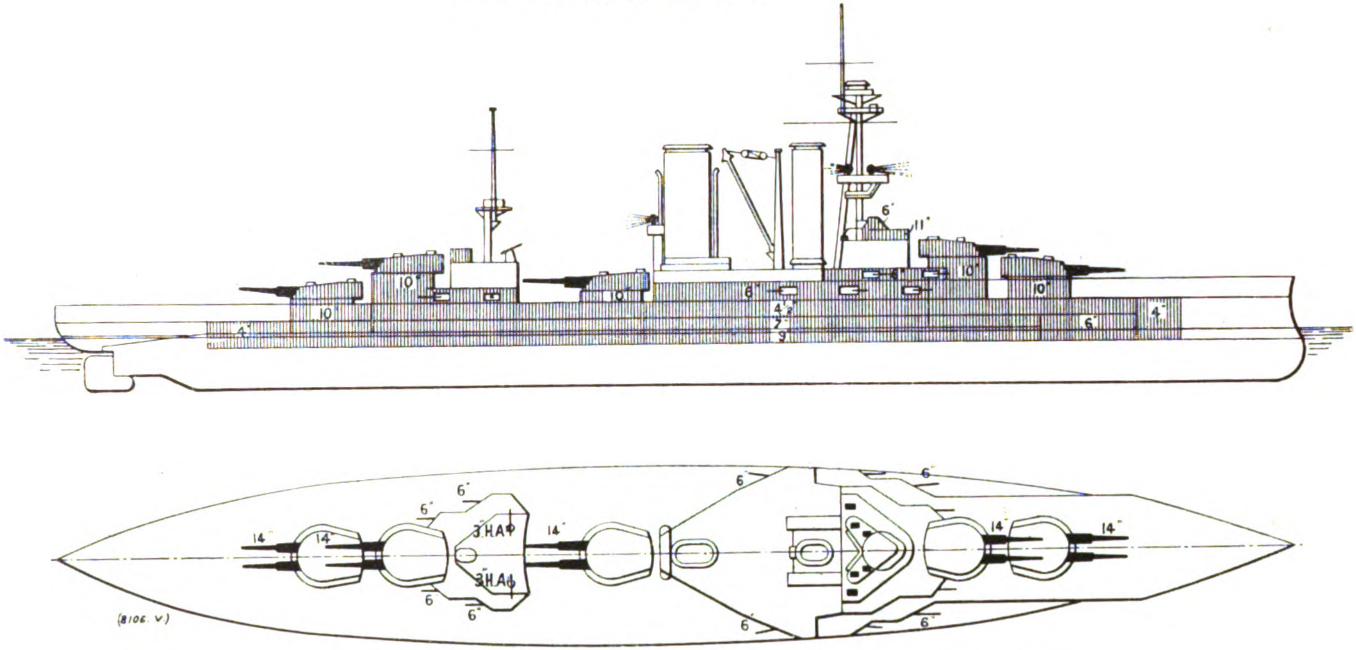
Length (extreme), 543 ft.; Length B.P., 500 ft.; 19,281 tons; Speed, 21·5 knots; Completed, 1909, 1910.
Armament, 12—12-in.; 22—4·7-in.; 8—3-pr.; 2—3-in. A.A.

Overhauled and refitted at Brooklyn Navy Yard, 1921-22, and A.A. guns installed.

CHILE.

BATTLESHIP.

Almirante Latorre (*formerly*) H.M.S. Canada)

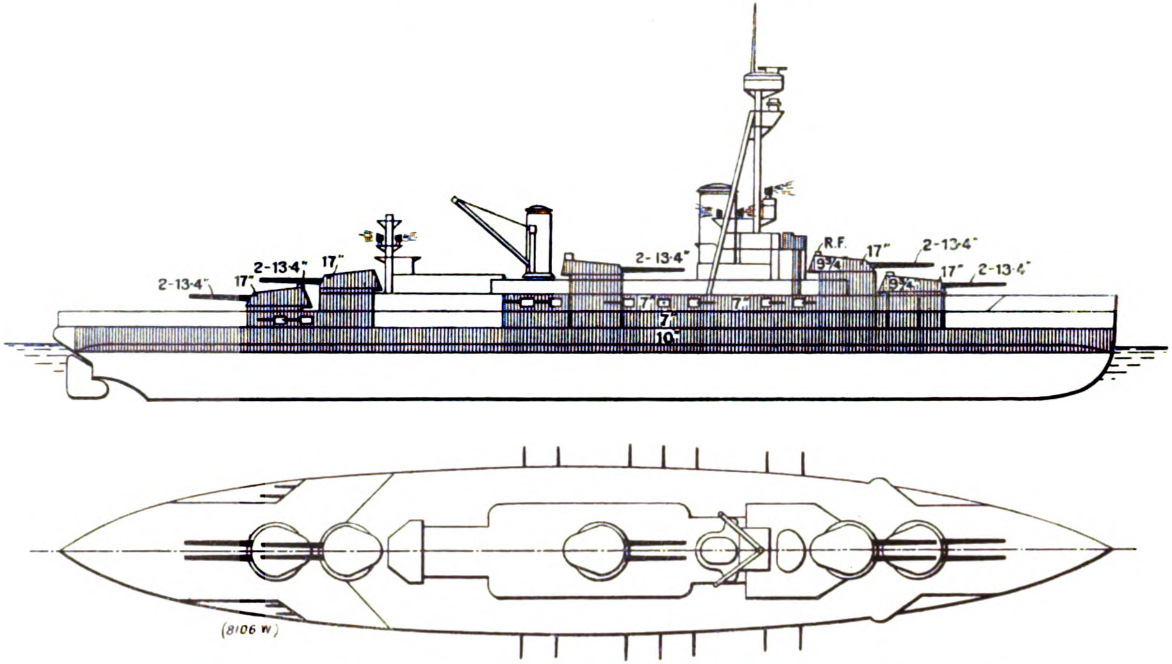


Length (extreme), 661 ft.; Length B.P., 625 ft.; 28,000 tons; Speed, 23 knots; Completed, 1915.
Armament, 10–14-in.; 14–6-in.; 2–3-in. A.A.; 4–3-pr.

FRANCE.

BATTLESHIPS.

Bretagne. Lorraine. Provence.

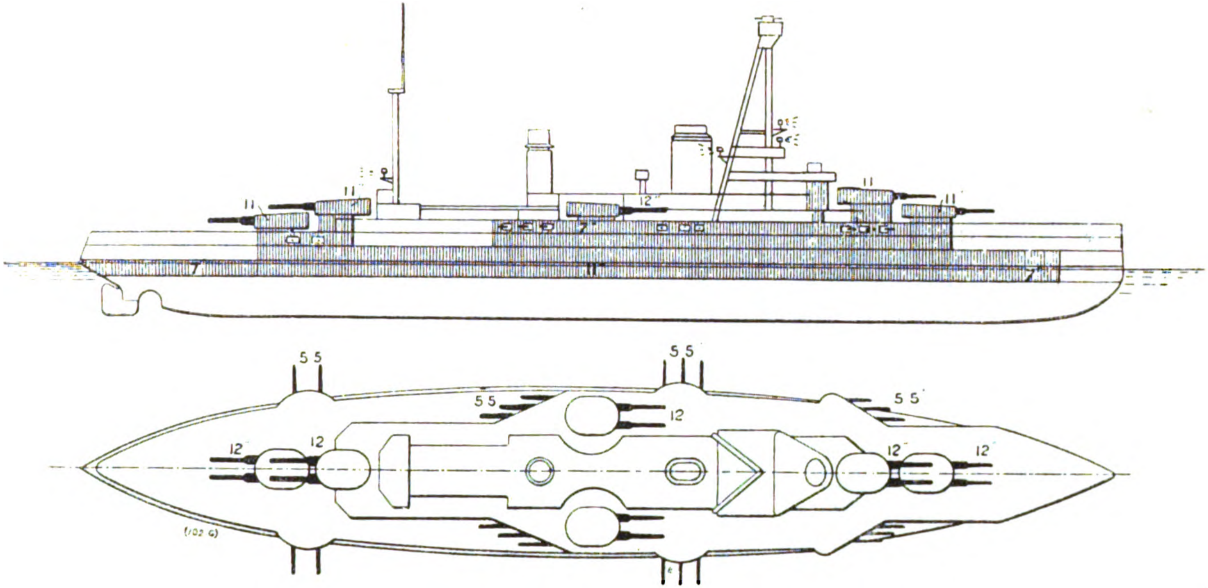


Length (extreme), 544 ft. 6 ins.; 23,128 tons; Speed, 20 knots; Completed, 1915–16; Reconstructed, 1919–20.
Armament, 10—13·4-in.; 18—5·5-in.; 4—3-in. A.A.; 5 3-pr.; 2—1-pr.

FRANCE.

BATTLESHIPS

Jean Bart. Courbet. Paris.

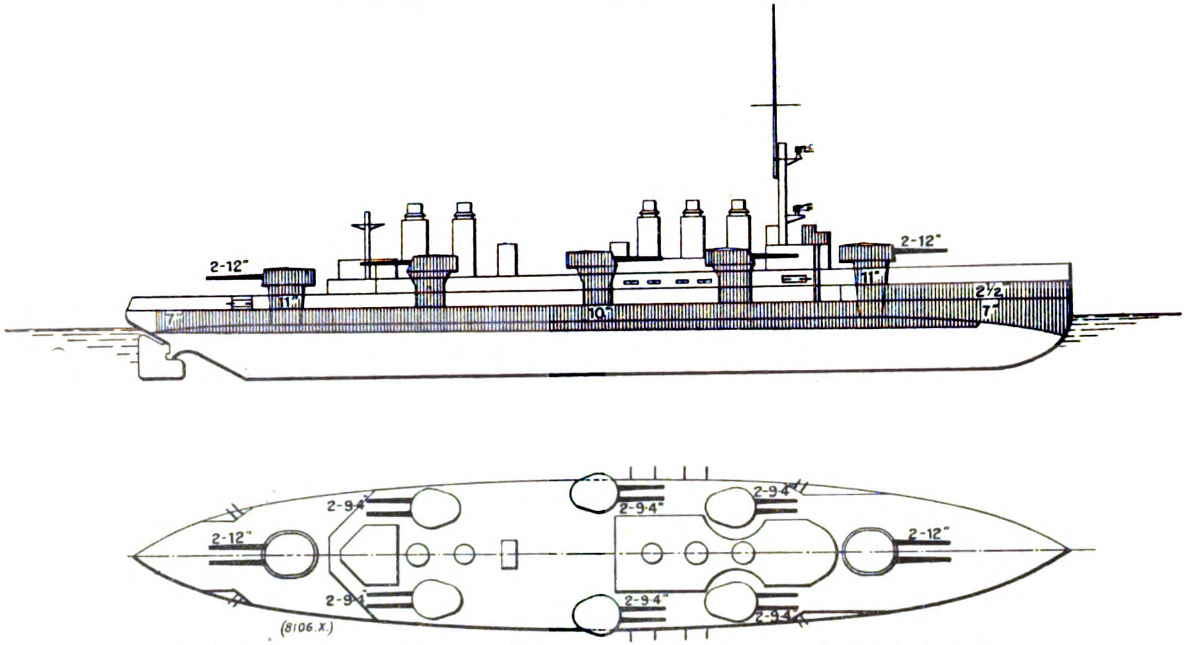


Length (extreme), 544 ft. 6 ins.; Length B.P., 541 ft. 4 ins.; 23,128 tons; Speed, 20 knots; Completed, 1913-14. Armament, 12—12-in.; 22—5·5-in.; 4—3-in. A.A.; 4—3-pr.; 2—1-pr. (Courbet has 3—3-pr.)

FRANCE.

BATTLESHIPS.

Condorcet. **Diderot.** **Voltaire.**

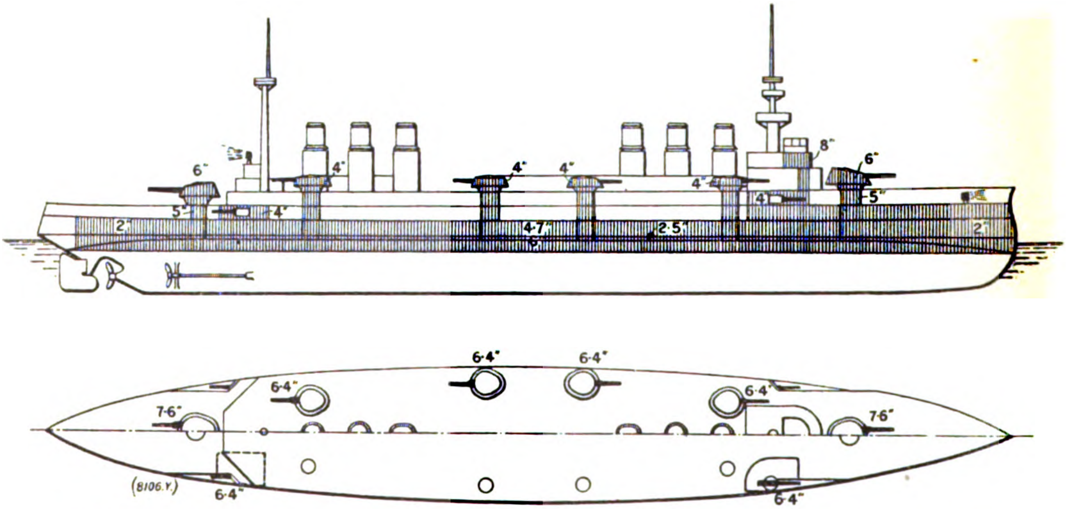


Length (extreme), 481 ft.; Length W.L., 475 ft. 9 ins.; Speed, 19¼ knots; 18,592 tons; Completed, 1911.
Armament, 4—12-in.; 12—9·4-in.; 12—3-in.; 4—3-pr. A.A.; 2—1-pr.

FRANCE.

ARMOURED CRUISERS.

Ernest Renan. **Jules Michelet**

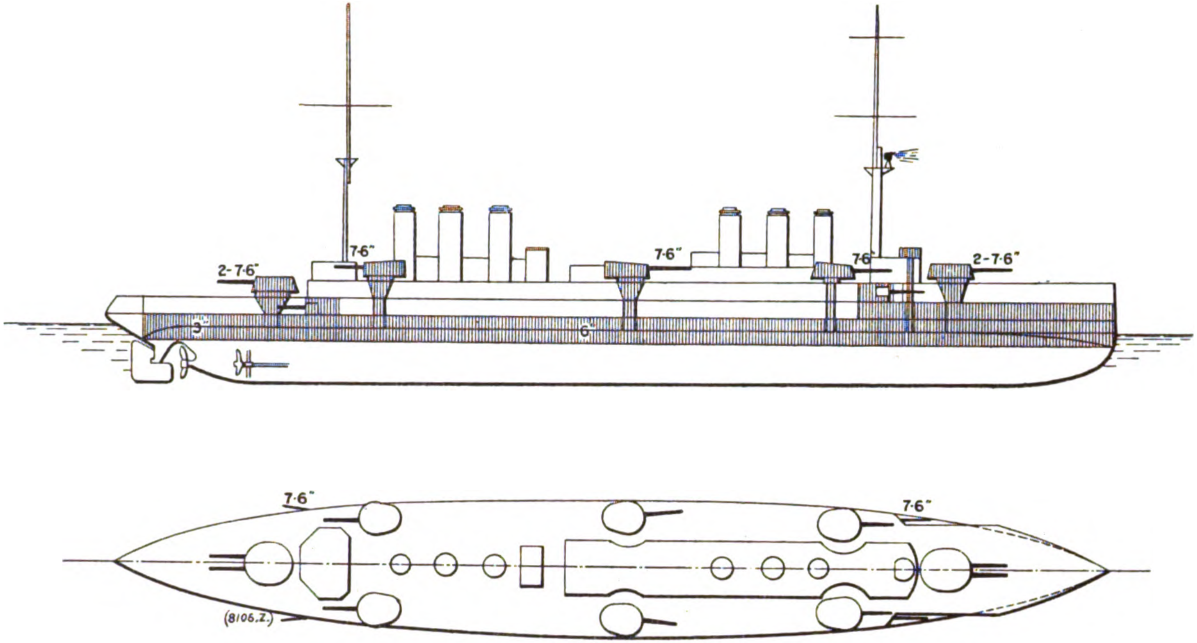


Length, 521 ft. 7 ins. and 489 ft. ; 13,500 tons and 12,400 tons ; Speed, 23 knots and 22 knots ; Completed, 1909 and 1908.
Armament, 4–7·6-in., 12—6·4-in. ; 4—3-in. ; 2—3-in. A.A. ; 18–9-pr. ; 2—1-pr.

FRANCE.

ARMOURED CRUISER.

Waldeck Rousseau.

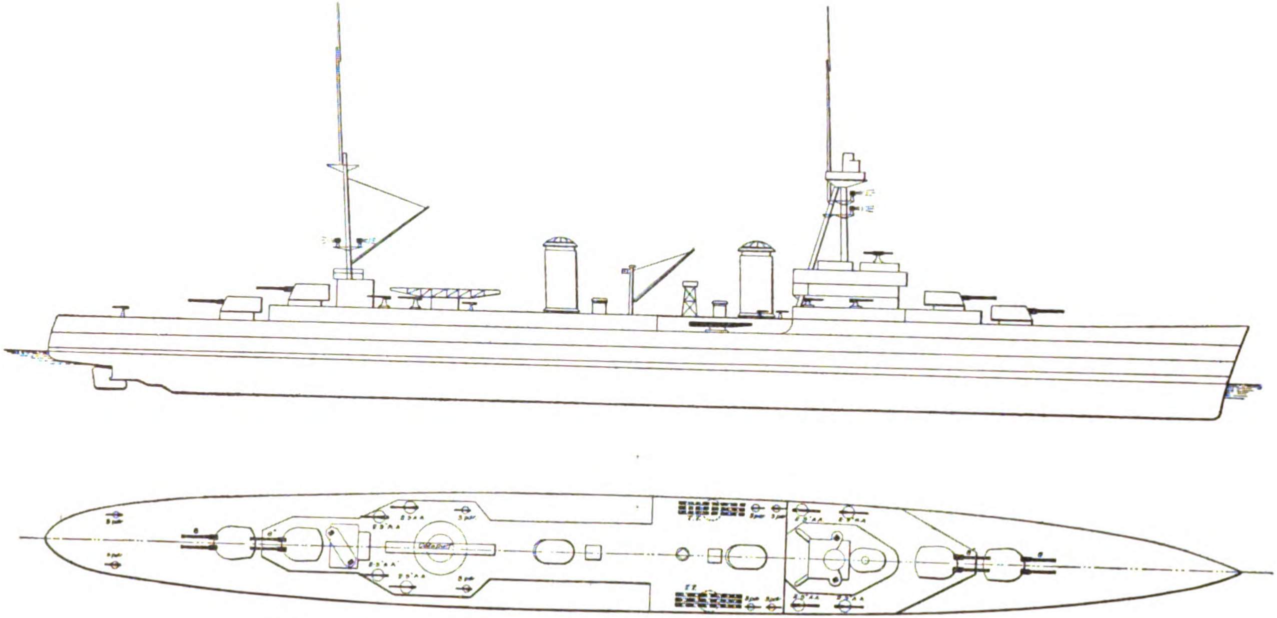


Length (extreme), 521 ft. 4 ins.; Length, W.L., 515 ft.; Speed, 23 knots; 13,828 tons; Completed, 1911.
Armament, 14—7·6-in.; 10—3-in.; 10—9-pr. A.A.; 2—3 pr.; 2 M.

FRANCE.

CRUISERS.

Duquesne. **Tourville.** **Suffren.** **Colbert.** **Foch.** **Dupleix.**

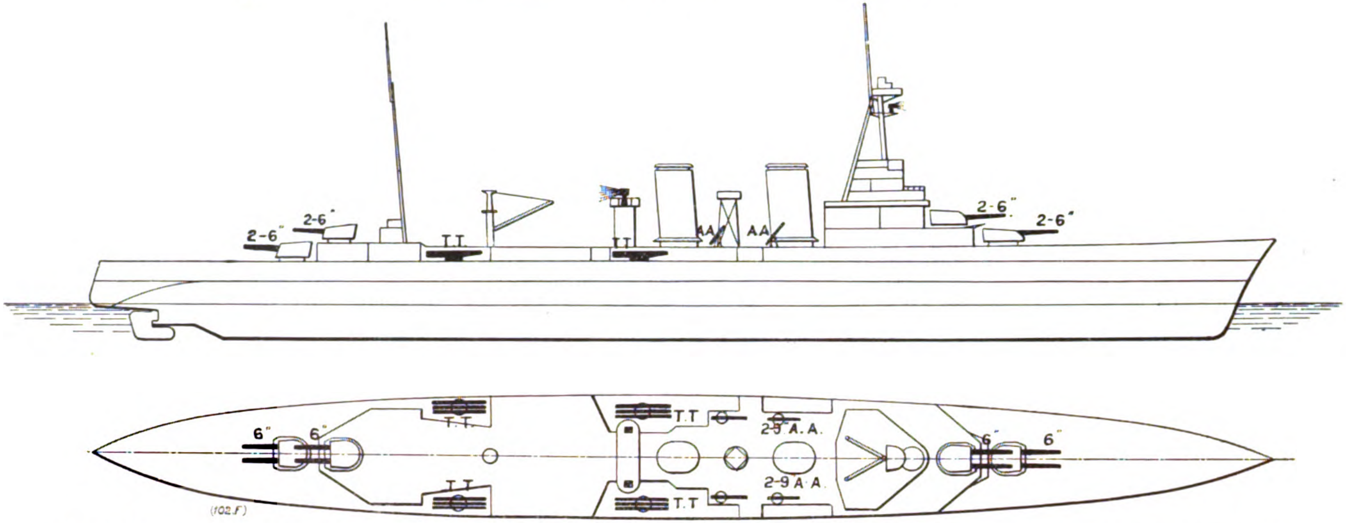


Length (extreme), 626 ft. 8 ins. ; Length B.P., 607 ft. ; 10,000 tons ; Speed, 34 knots. Completed, 1928.
Armament, 8—8-in., 8—3-in. A.A. ; 8—1-pr. ; 2—triple T.T.'s. Fitted with a catapult. Carries 2 seaplanes.

FRANCE.

LIGHT CRUISERS.

La Motte Piquet. **Duguay-Trouin.** **Primauguet.**



Length (extreme), 594 ft. 10 ins.; Length B.P., 575 ft.; 7,234 tons; Speed, 34 knots. First two ships of class laid down in August, 1922, and January, 1923. Completed, 1926.

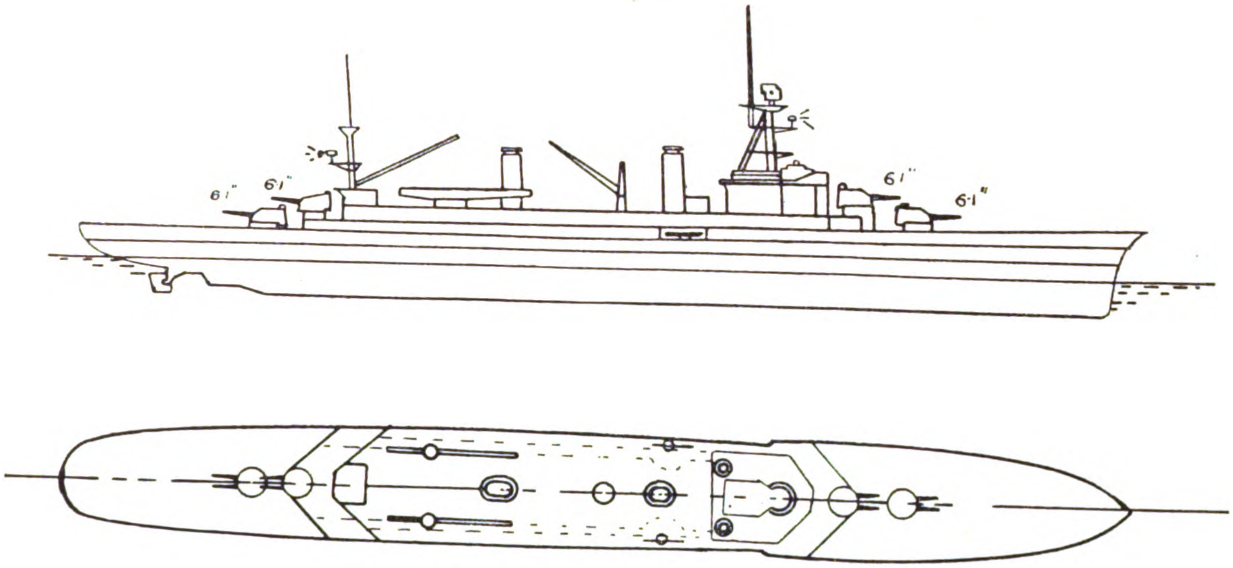
Armament, 8—6·1-in.; 4—3 in. A.A.; 2—3-pr.; 4 triple torpedo tubes (21·7-in. torpedoes) and 1 reconnaissance seaplane.

NOTE.—Reported to have protection to magazines.

FRANCE.

TRAINING CRUISERS.

Jeanne d'Arc.

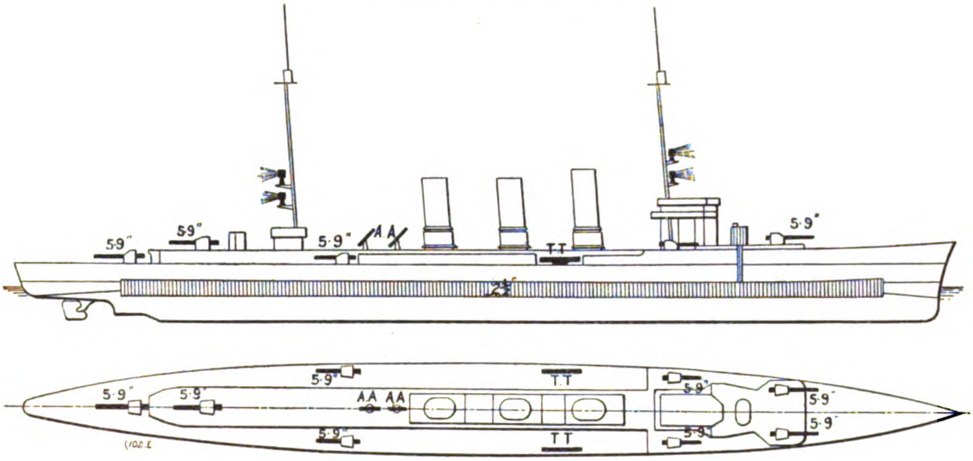


Length (extreme), 557 ft. 8 ins.; 6,500 tons; Speed, 26·5 knots.
Armament, 8—6·1-in.; 4—2·9-in. A.A.; 2—1·6-in.

FRANCE.

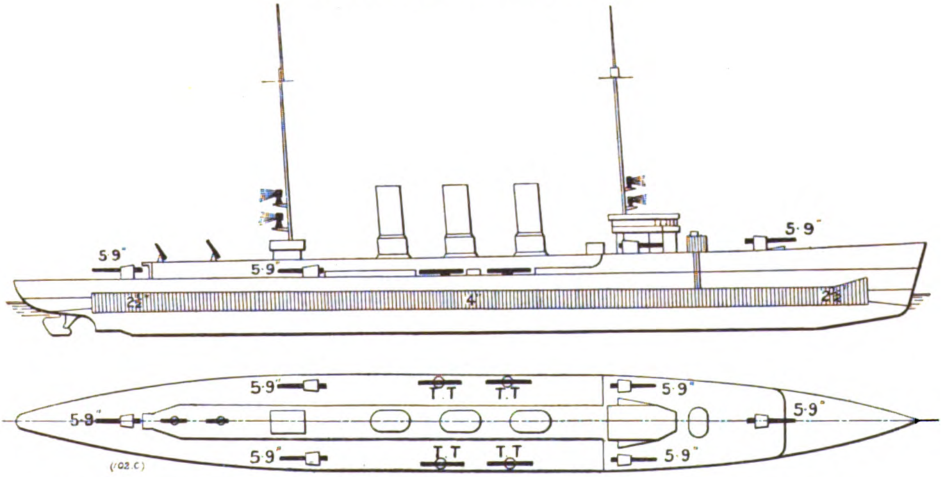
LIGHT CRUISERS.

Metz (*ex-German* **Königsberg**).



Length (water-line), 489 ft. ; 6,100 tons ; Speed, 27·5 knots ; Completed, 1916.
Armament, 8—5·9-in. ; 2—3-in. A.A. ; 4 M. ; 4 torpedo tubes (2 above water, 2 submerged).

Strasbourg (*ex-German* **Regensburg**).

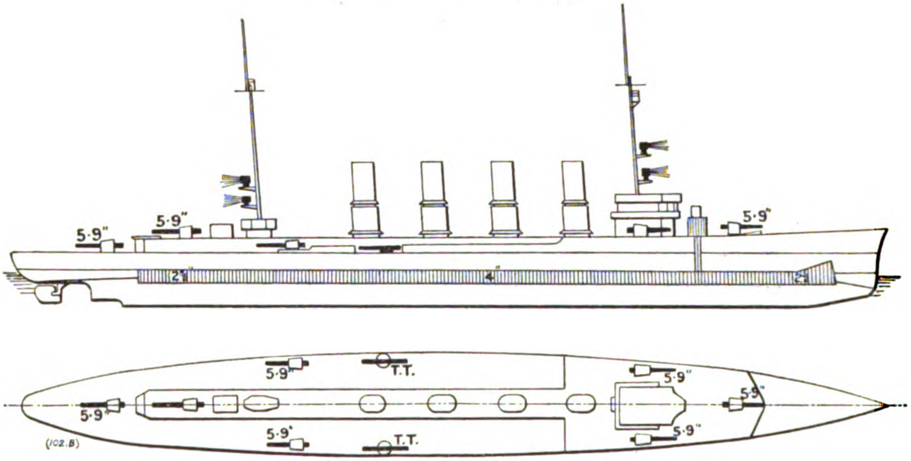


Length (extreme), 468 ft. ; Length (water-line), 456 ft. ; 5,510 tons ; Speed, 27 knots ; Completed, 1914.
Armament, 6—5·9-in. ; 1—3-in. A.A. ; 4 torpedo tubes (19·7-in. torpedoes).

FRANCE.

LIGHT CRUISER.

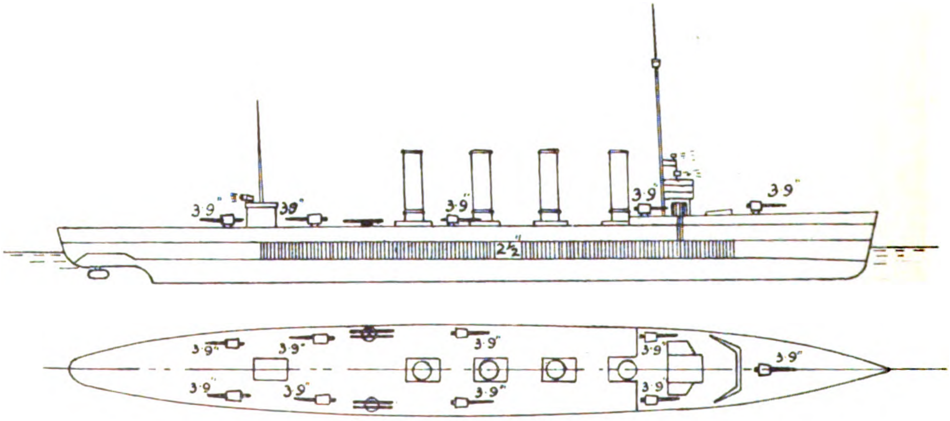
Mulhouse (*ex-German* **Stralsund**).



Length (water-line), 446 ft. 3 ins.; 4,480 tons; Speed, 28·27 knots; Completed, 1913.
Armament, 7—5·9-in.; 2—3-in. A.A.; 2 M.; 2 torpedo tubes (19·7-in. torpedoes).

LIGHT CRUISER.

Thionville (*ex-Austrian* **Novara**).

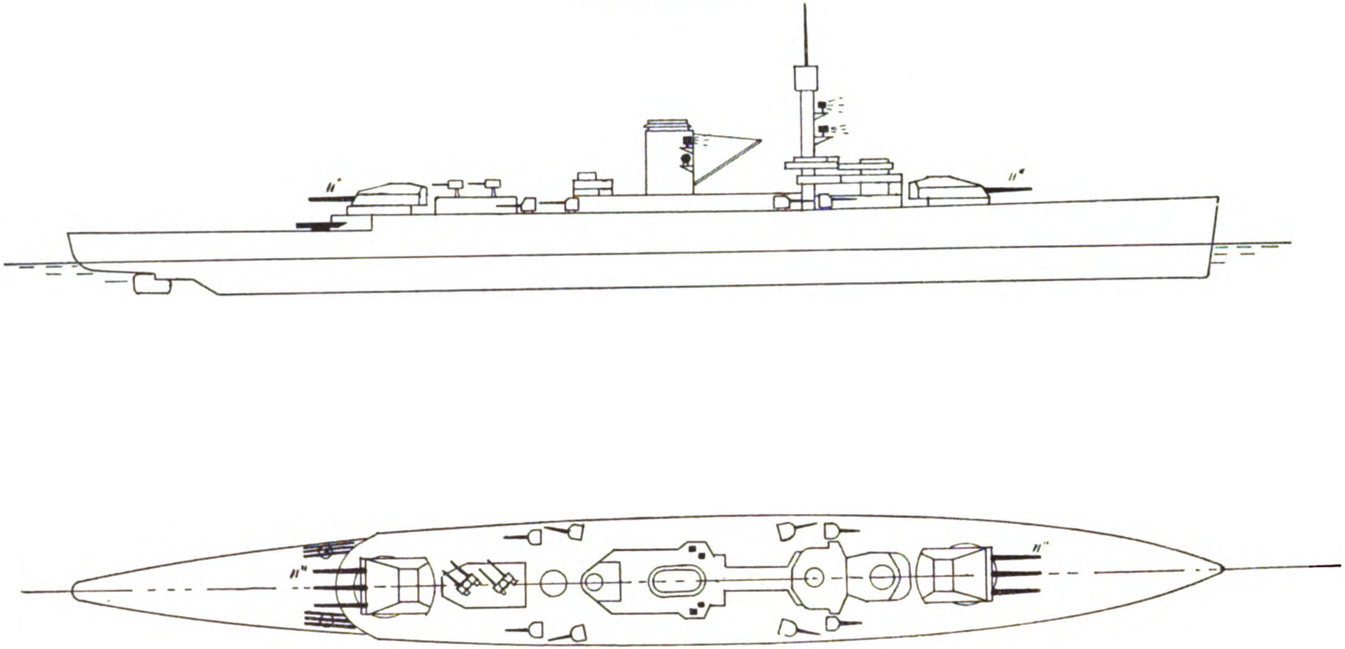


Length (extreme), 428 ft. 6 ins.; 3,395 tons; Speed, 27 knots.
Armament, 9—3·9-in.; 2—3-in. A.A.; 2 twin above-water torpedo tubes.

GERMANY.

BATTLESHIP.

Ersatz Preussen.

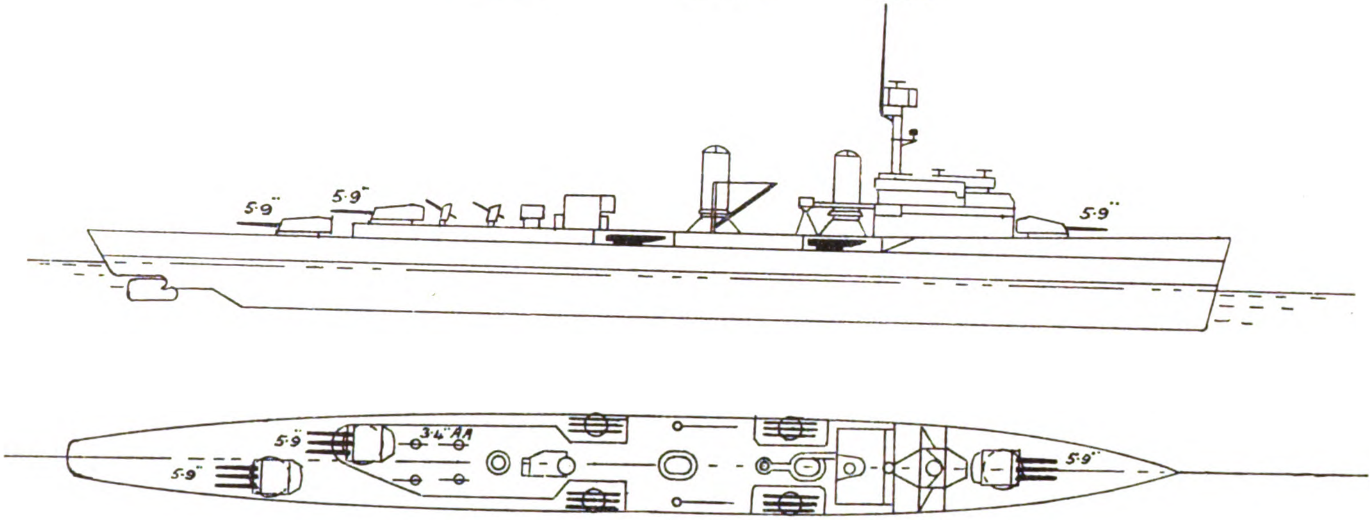


Length (extreme), 600 ft. ; 9,840 tons ; Speed, 26 knots.
Armament, 6—11-in. : 8—5·9-in. ; 4—3-in.

GERMANY.

LIGHT CRUISERS.

Königsberg. **Karlsruhe.** **Köln.**

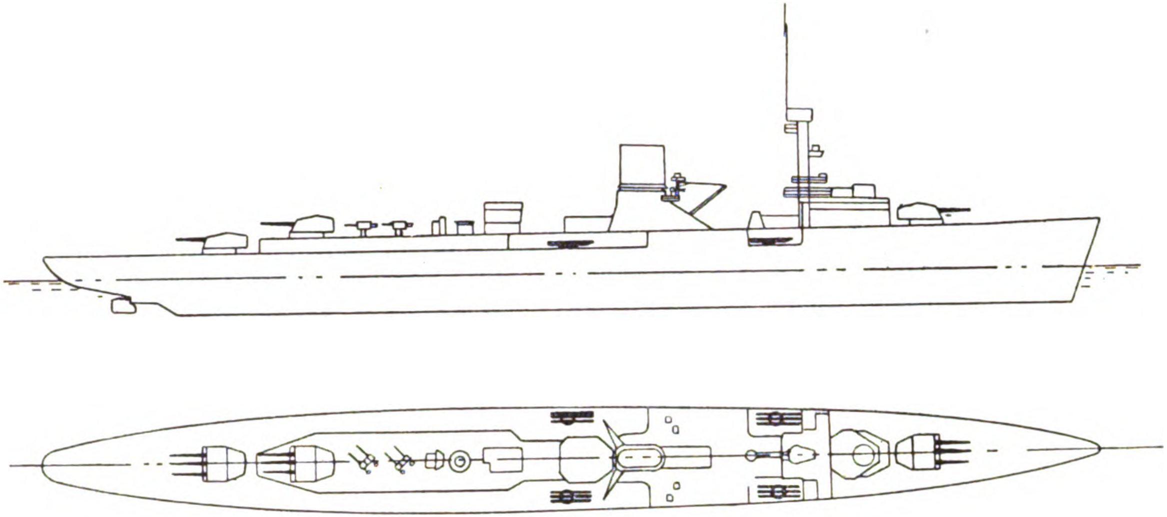


Length (extreme), 570 ft. 10 ins.; 6,000 tons; Speed, 32 knots.
Armament, 9—5·9-in.; 4—3·4-in. A.A.; 4 triple torpedo tubes.

GERMANY.

LIGHT CRUISER,

Leipzig.

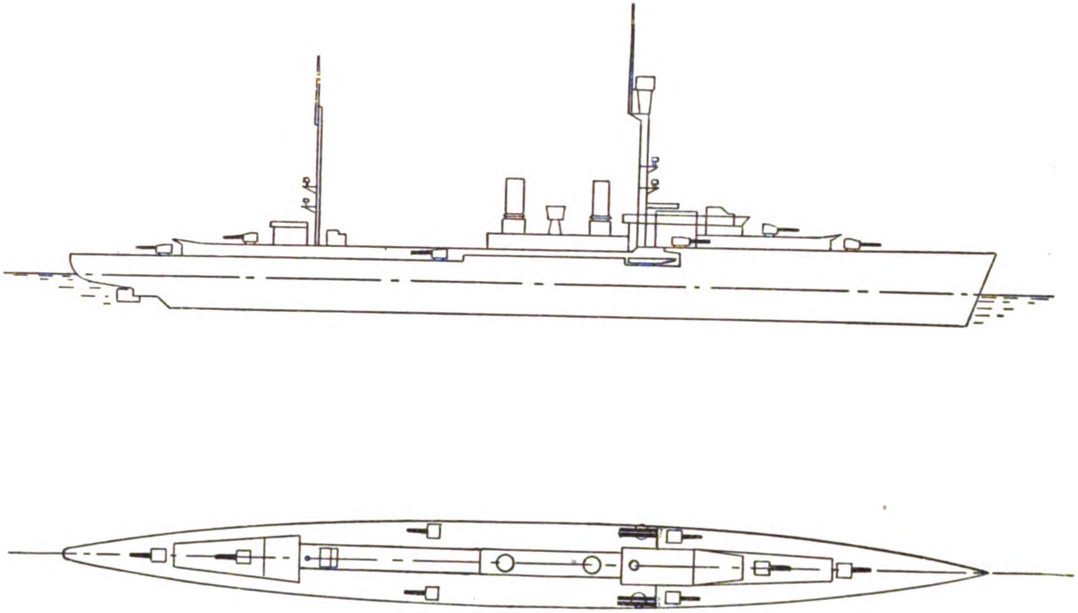


Length (W.L.), 543 ft. 10 ins.; 6,000 tons; Speed, 32 knots.
Armament, 9—5·9 in.; 4—3·4 in. A.A.; 4 triple torpedo tubes.

GERMANY.

LIGHT CRUISER.

Emden.

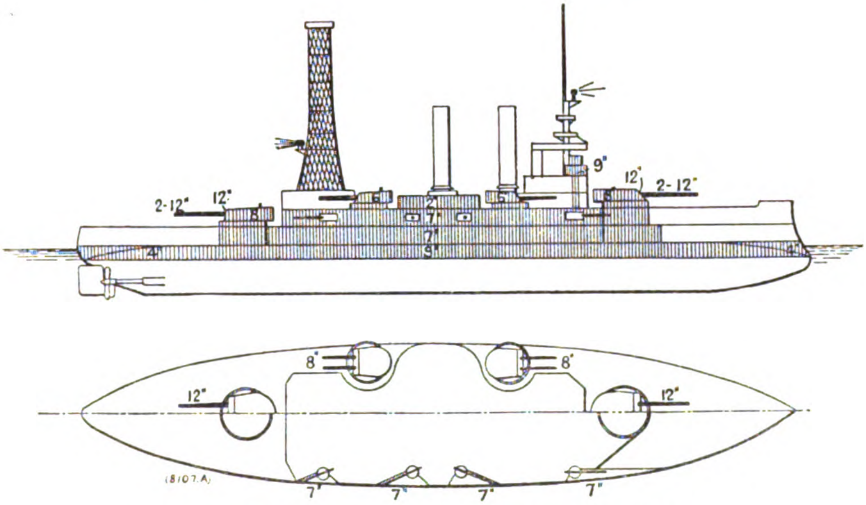


Length (extreme), 510 ft. 2 ins. ; 6,000 tons ; Speed, 29 knots ; Completed, 1925.
Armament, 8—5·9-in. ; 2—3·5-in. A.A. ; 4 double torpedo tubes.
The 8—5·9-in guns will be mounted in twin mountings, 2 forward and 2 aft, when the mountings are ready.

GREECE.

BATTLESHIPS.

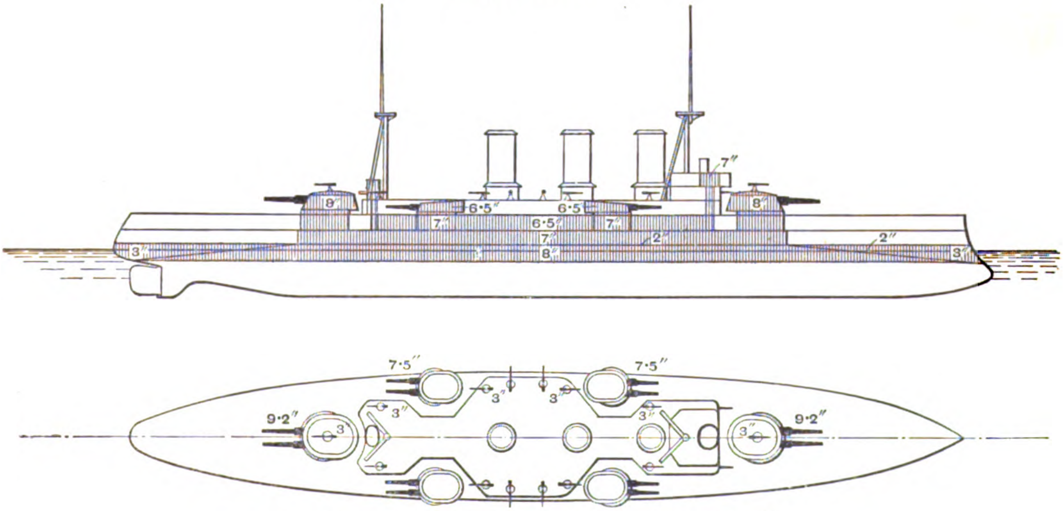
Lemnos (*ex*-Idaho). Kilkis (*ex*-Mississippi).



Length, 382 ft. ; 13,000 tons ; Speed, 17·1 knots ; Completed, 1908.
Armament, 4—12·in. ; 8—8·in. ; 8—7·in ; 8—3 in. ; 2—3·in. A.A. ; 4—6 pr. ; 14 smaller.

ARMOURED CRUISER.

Giorgios Averoff.

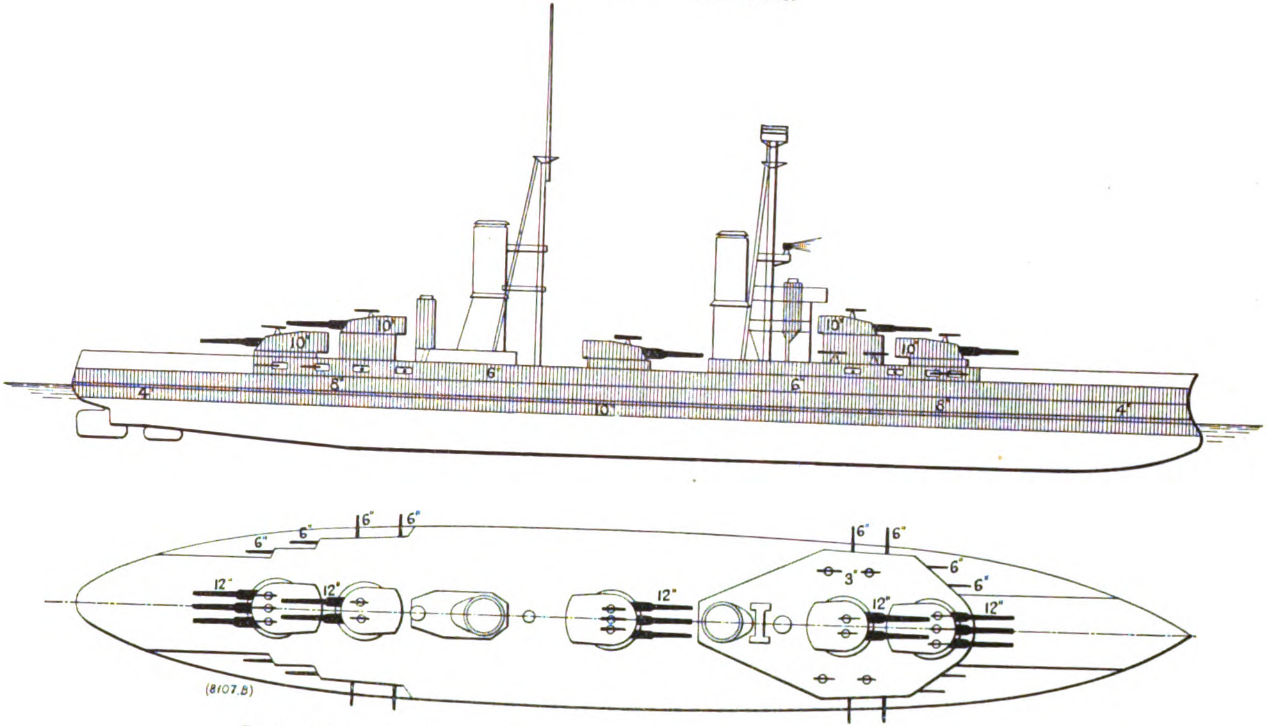


Length, 462 ft. ; 9,956 tons ; Speed, 24 knots ; Completed, 1911.
Armament, 4—9·2·in. ; 8—7·5·in. ; 16—14·pr. ; 2—3·in. A.A. ; 6 smaller.

ITALY.

BATTLESHIPS.

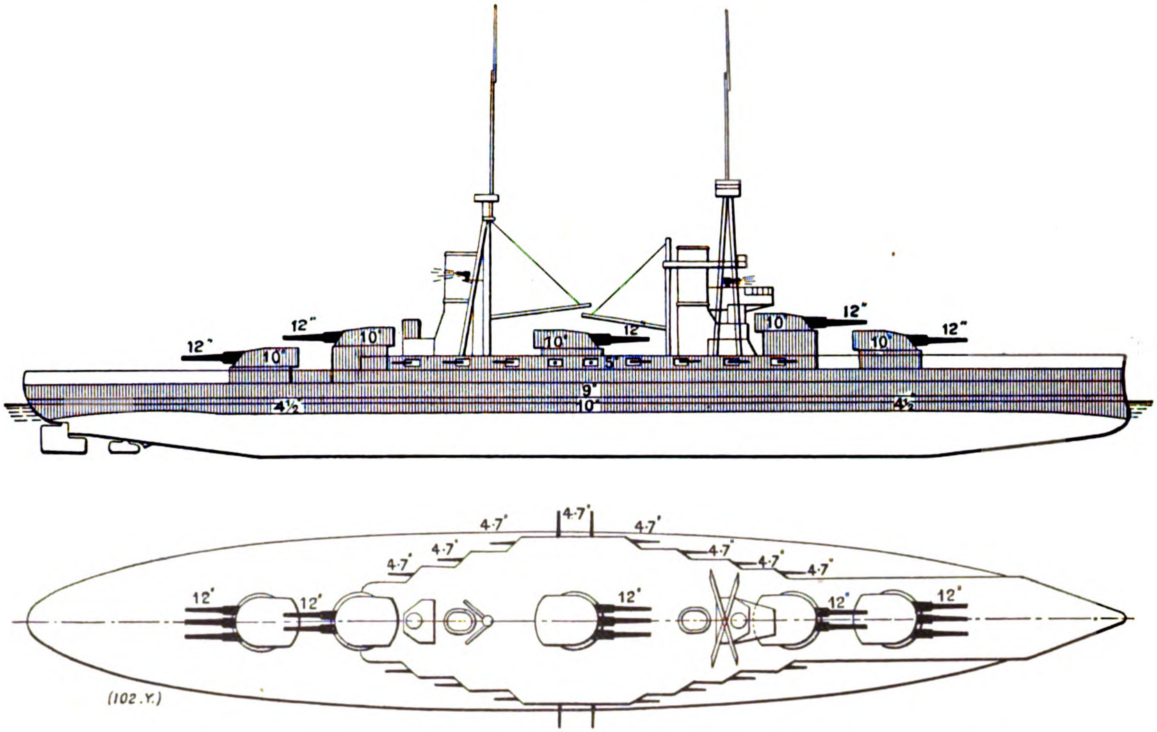
Andrea Doria. Caio Duilio.



Length (extreme). 575 ft. 9 ins. ; Length B.P., 554 ft. 4 ins. ; Speed, 21 knots ; Completed, 1915.
Armament, 13—12-in. ; 16—6-in. ; 13—14 pr. ; 6—14 pr. A.A. ; 2—2-pr. ; 6 M. ; 4 L.

ITALY.

Conte di Cavour.* **Giulio Cesare.**

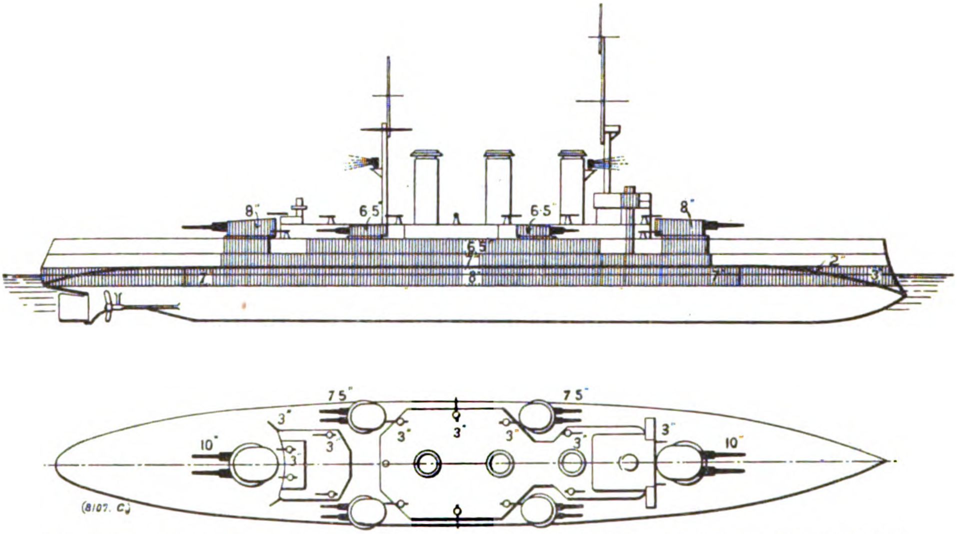


Length (extreme), 575 ft. 9 ins.; Length B.P., 554 ft. 4 ins.; Speed, 22 knots; 22,500 tons; Completed, 1914-1915.
Armament, 13—12-in.; 18—4·7-in.; 13—14-pr.; 6—14-pr. A.A.; 2 - 2-pr.
* A fixed catapult is mounted on port side of Forecastle Deck forward.

ITALY.

ARMOURED CRUISER.

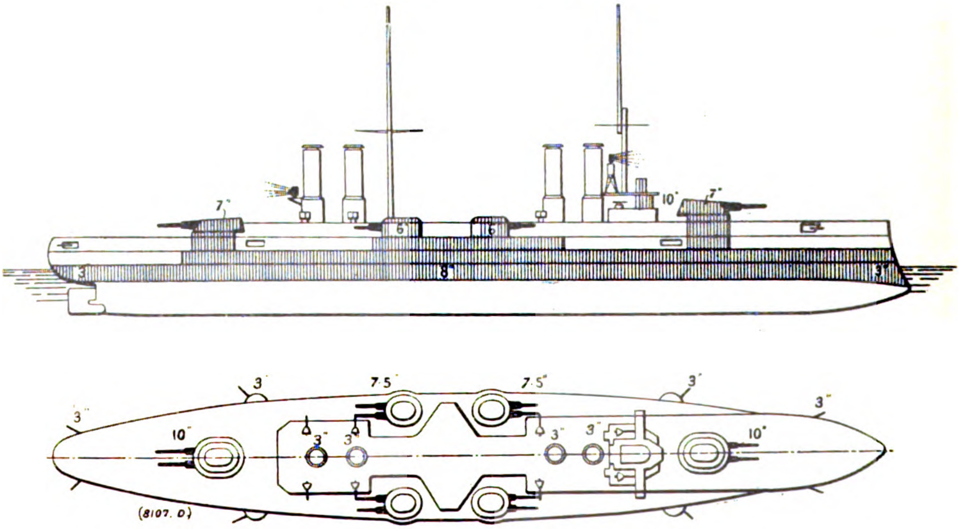
Pisa.



Length (extreme), 460 ft. 11 ins. ; Length B.P., 426 ft. 6 ins. ; Speed, 23 knots ; 10,430 tons ; Completed, 1908.
Armament, 4—10-in. ; 8—7·5-in. ; 12—3-in. ; 6—14-pr. A.A.
Boys' Training Ship.

ARMOURED CRUISERS.

S. Giorgio. S. Marco.

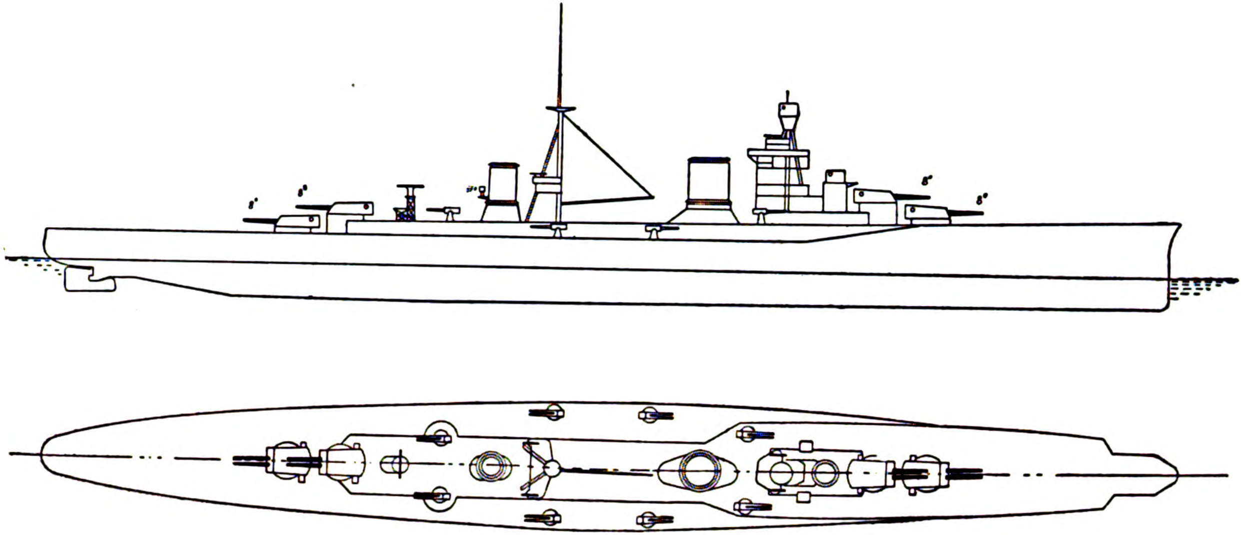


Length (extreme), 462 ft. 2 ins. ; Length B.P., 429 ft. 10 ins. ;
Speed, 22·5 and 23 knots ; 10,000 and 10,920 tons ; Completed, 1910.
Armament, 4—10-in. ; 8—7·5-in. ; 10—14-pr. ; 6—14-pr. A.A.

ITALY.

CRUISER.

Bolzano.



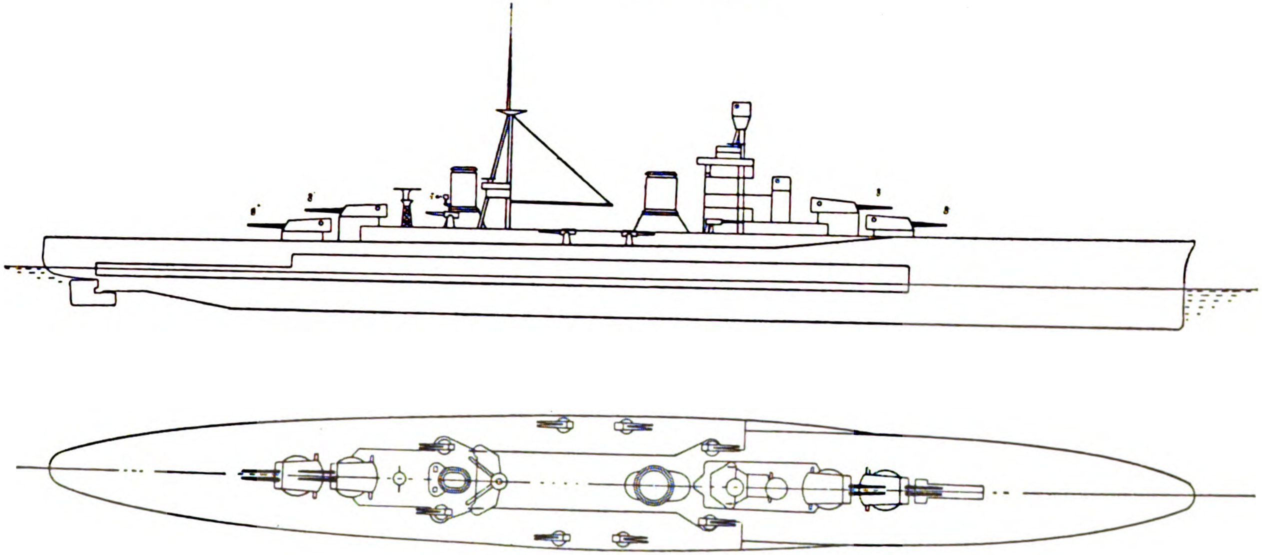
Length (extreme), 590 ft. 9 ins.; 10,000 tons.

Armament, 8—8-ins.; 16—3·9-in. A.A.

ITALY.

CRUISERS.

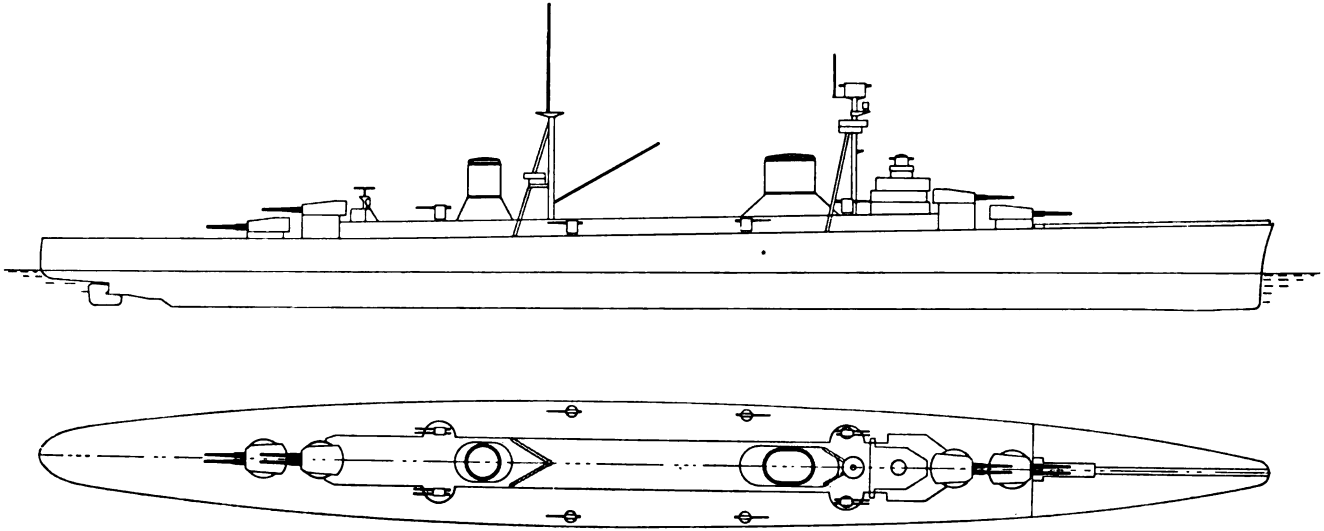
Zara. **Fiume.** **Gorizia.**



Length, 600 ft.; 10,000 tons; Speed, 33 knots.
Armament, 8—8-in., 16—3·9-in.

ITALY.

CRUISERS.



Trento. Trieste.

Length (extreme), 640 ft. 9 ins. ; 10,000 tons ; Speed, 35 knots ; Completed, 1928.
Armament, 8—8-in., 12—4-in. ; 2 twin T.T. s.

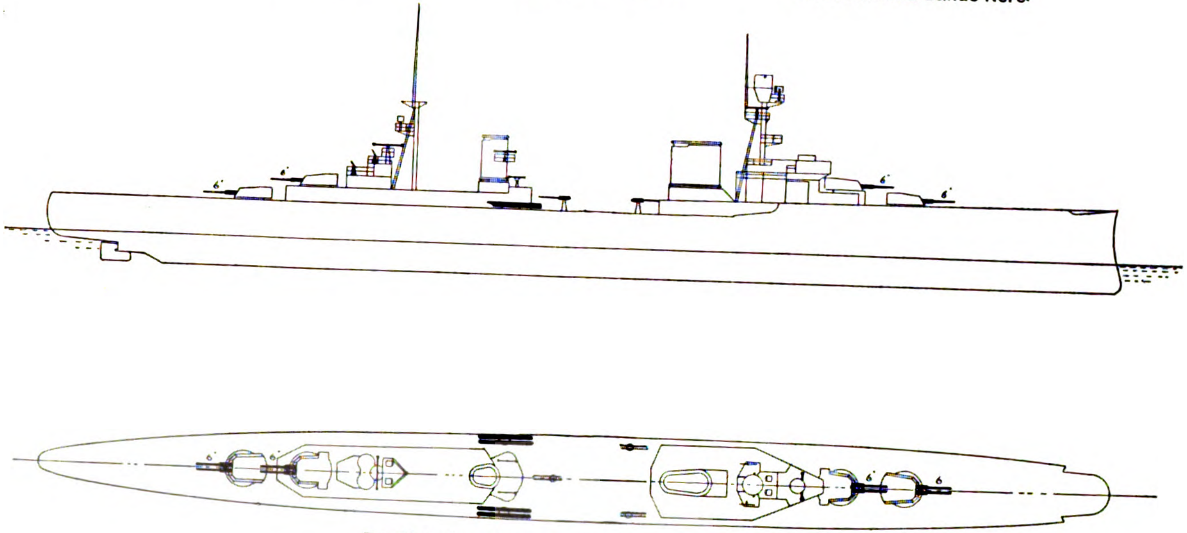
ITALY.

CRUISERS.

Armando Diaz.
Luigi Cadorna.

Alberto di Guissano.
Alberico di Barbiano.

Bartolomeo Colleoni.
Giovanni della Bande Nere.

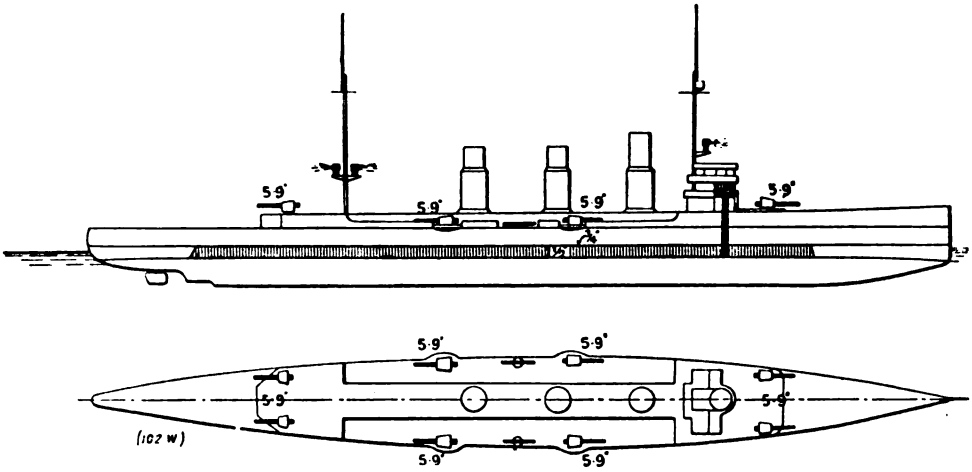


Length (extreme), 559 ft.; 4,900 tons; Speed, 37 knots.
Armament, 8—6-in.; 6—4-in. A.A.

ITALY.

LIGHT CRUISER.

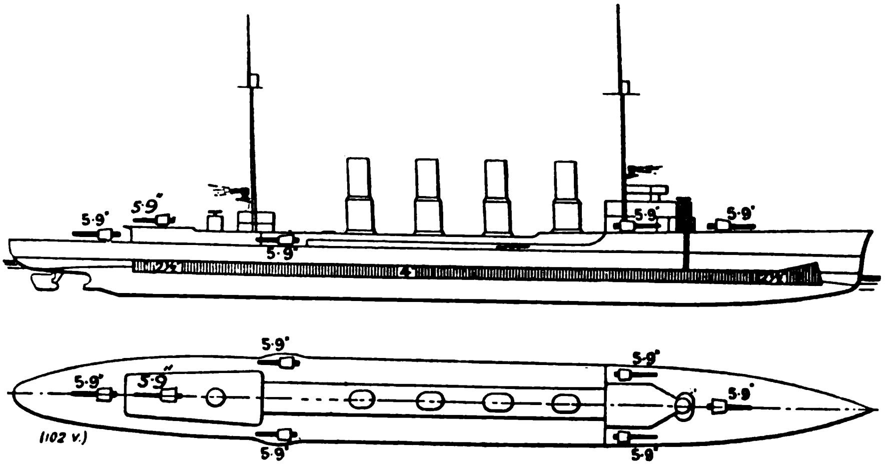
Bari (*ex-German* Pillau)



**Length (extreme), 441 ft.; Length B.P., 403 ft.; 4,250 tons; Speed, 27·5 knots; Completed, 1914.
Armament, 8—5·9-in.; 3—3-in. A.A.; 2 above-water torpedo tubes (19·7-in. torpedoes); 120 mines.**

LIGHT CRUISER.

Taranto (*ex-German* Strassburg).

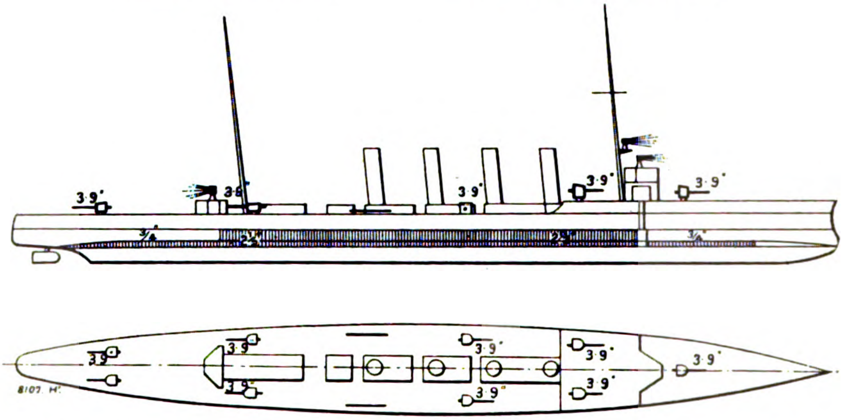


**Length (water-line), 446 ft. 3 ins.; 4,480 tons; Speed, 26·9 knots; Completed, 1912.
Armament, 7—5·9-in.; 2—3-in. A.A.; 2 torpedo tubes submerged (19·7-in. torpedoes ; 120 mines.**

ITALY.

LIGHT CRUISERS.

Venezia (*ex-Austrian* **Saida**). **Brindisi** (*ex-Austrian* **Helgoland**).

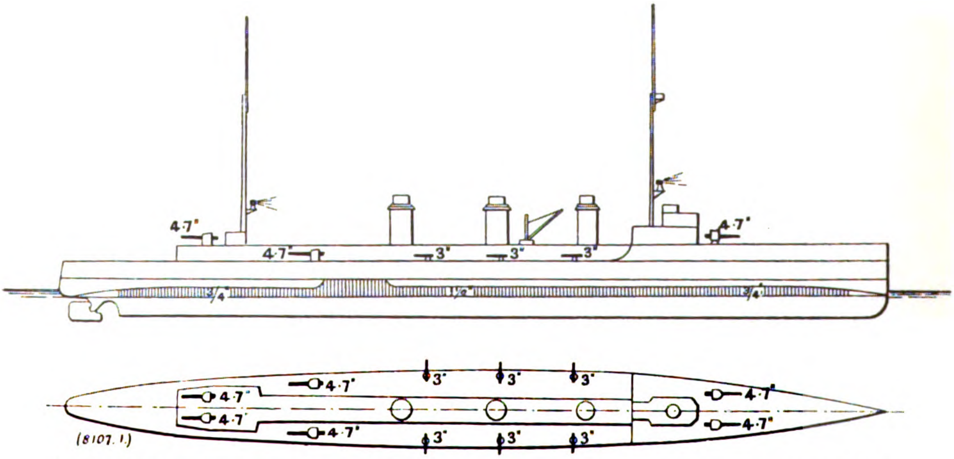


Length (extreme), 430 ft.; Length (W.L.), 416 ft. 9 ins.; Speed, 27 knots; 3,450 tons; Completed, 1914–15.
Armament, 9—3·9-in.; 1—3-in. A.A.; 170 mines; 2 twin above-water torpedo tubes.

NOTE.—Thionville (*ex*-Novara), sister ship, allocated to France.

LIGHT CRUISER.

Quarto.

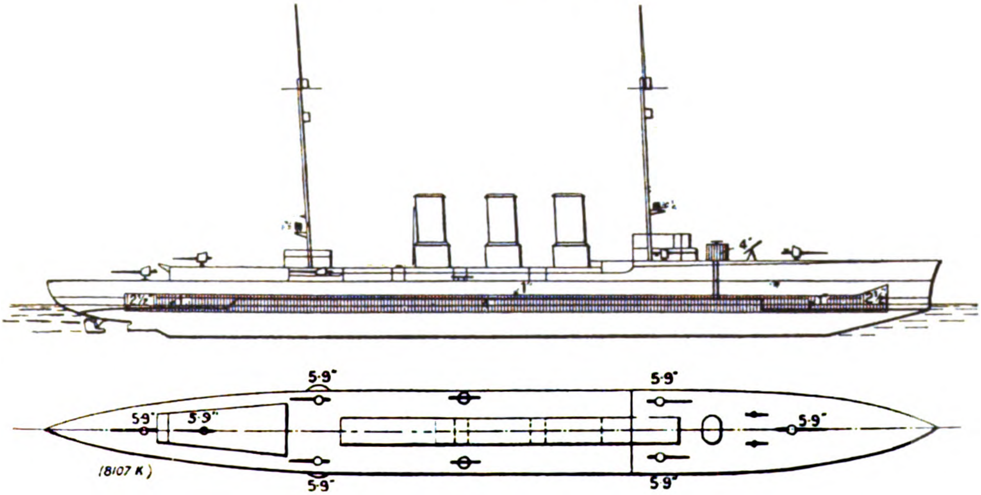


Length (extreme), 431 ft. 9 ins.; Length B.P., 413 ft. 5 ins.; Speed, 28 knots; 3,390 tons; Completed, 1912.
Armament, 6—4·7-in.; 6—14-pr.; 2—2-pr. A.A.; 2 above-water 18-in. torpedo tubes; 126 mines.

ITALY.

LIGHT CRUISER.

Ancona (*formerly German* **Graudenz**)

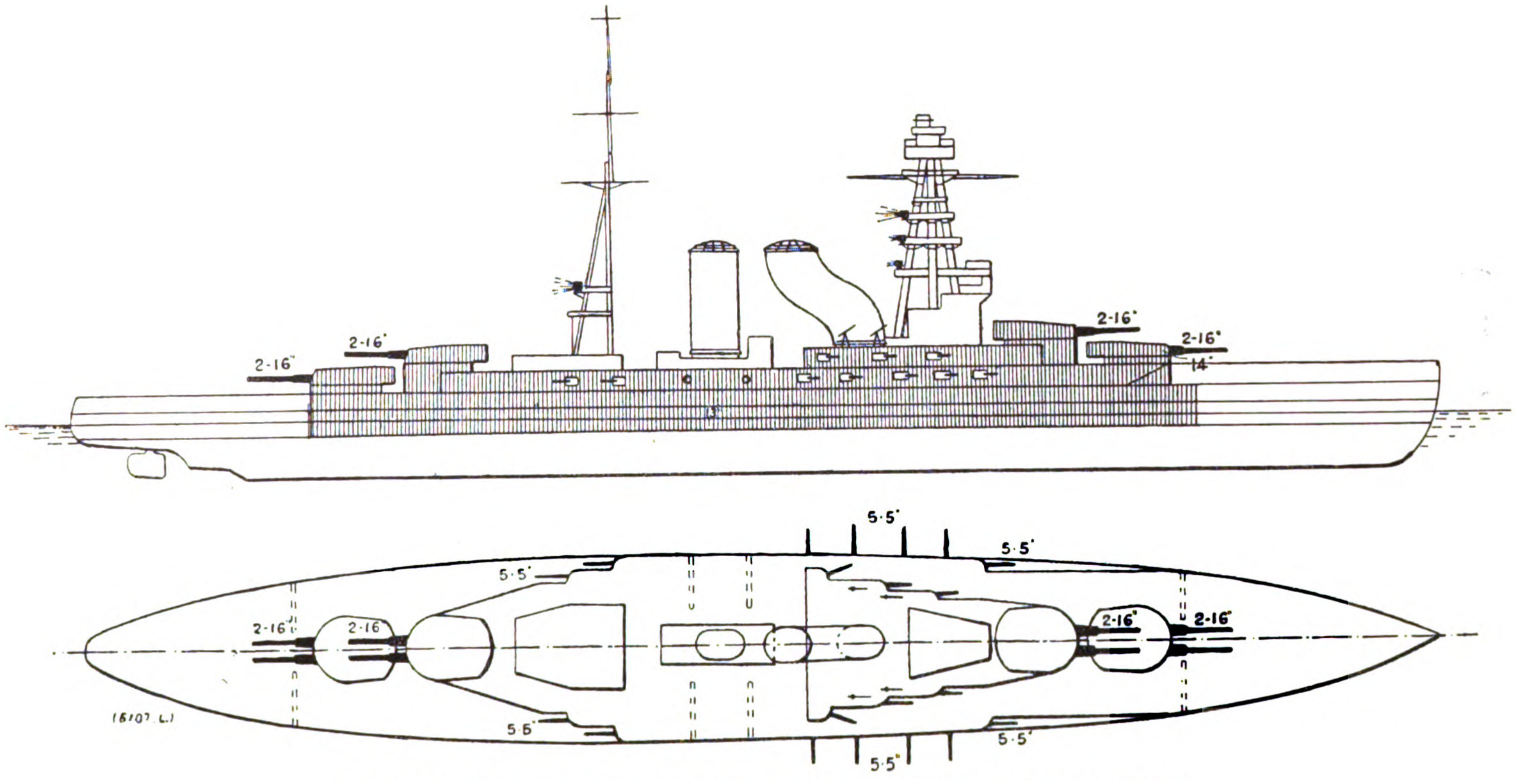


Length (extreme), 456 ft. ; Speed, 27½ knots ; 4,842 tons ; Completed, 1914.
Armament, 7—5·9-in. ; 2—3-in. A.A. ; 2 submerged and 2 above-water torpedo tubes ; 120 mines.

JAPAN.

BATTLESHIPS.

Nagato. **Mutsu.**

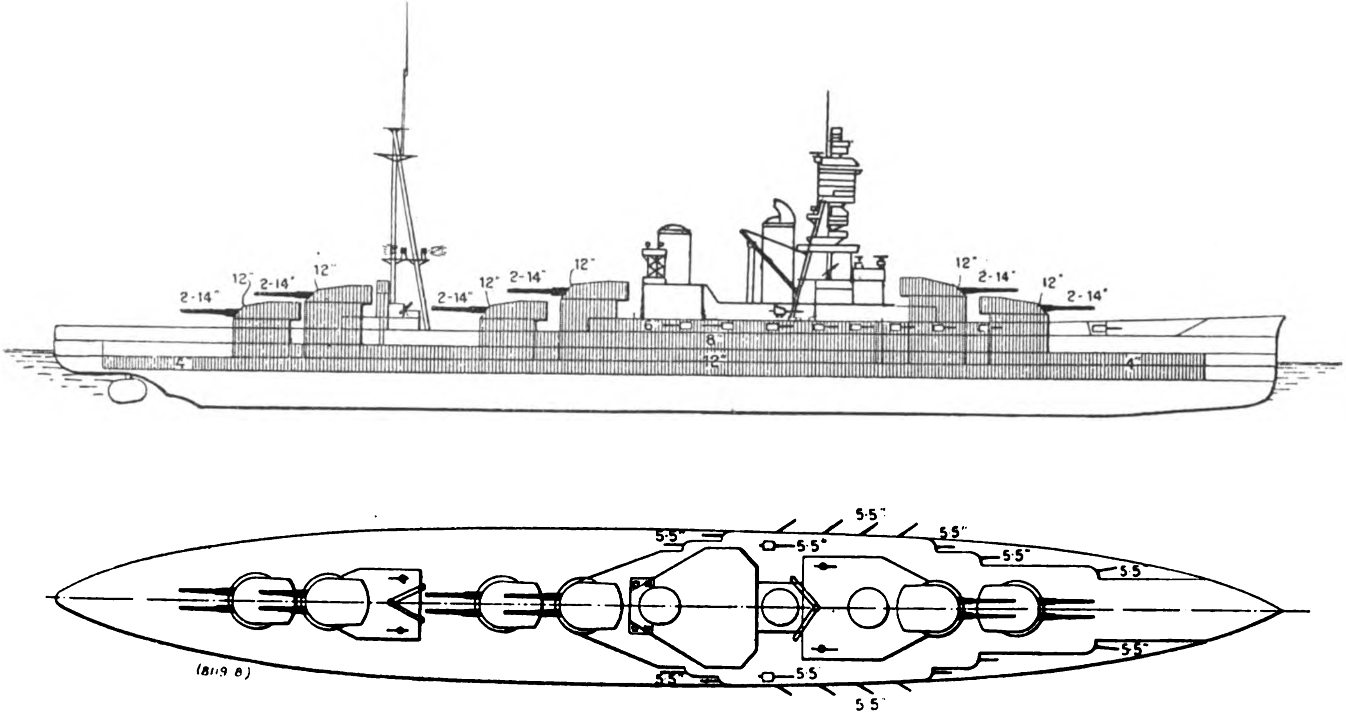


Length (extreme), 700 ft. ; Length B.P., 660 ft. 7 ins. ; Speed, 23 knots ; 32,270 tons ; Completed, 1920-1921.
Armament, 8—16-in. ; 20—5·5-in. ; 4—3-in. A.A. 4 above-water and 4 submerged 21-in. torpedo tubes.

JAPAN.

BATTLESHIPS.

Ise. **Hyuga.**

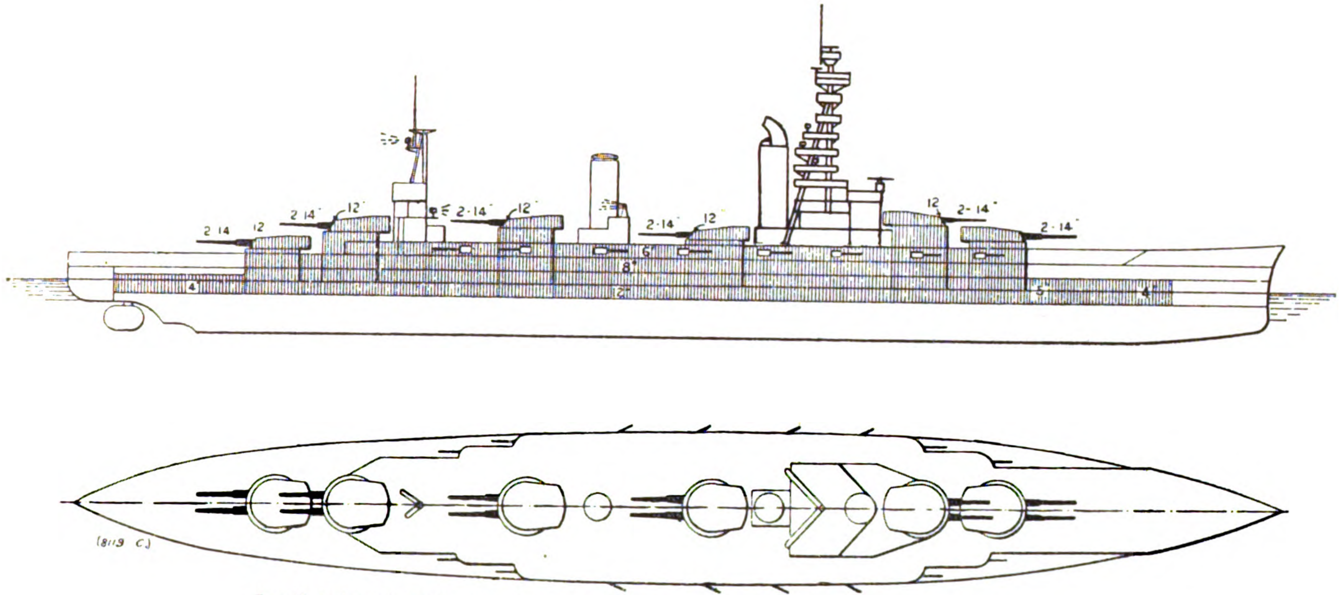


Length (extreme), 683 ft. ; Length B.P., 640 ft. ; Speed, 23 knots ; 29,990 tons ; Completed, 1917-18.
Armament, 12—14-in, ; 20—5·5-in. ; 4—3-in. A.A. 6 submerged 21-in. torpedo tubes.

JAPAN.

BATTLESHIPS.

Fuso. Yamashiro.

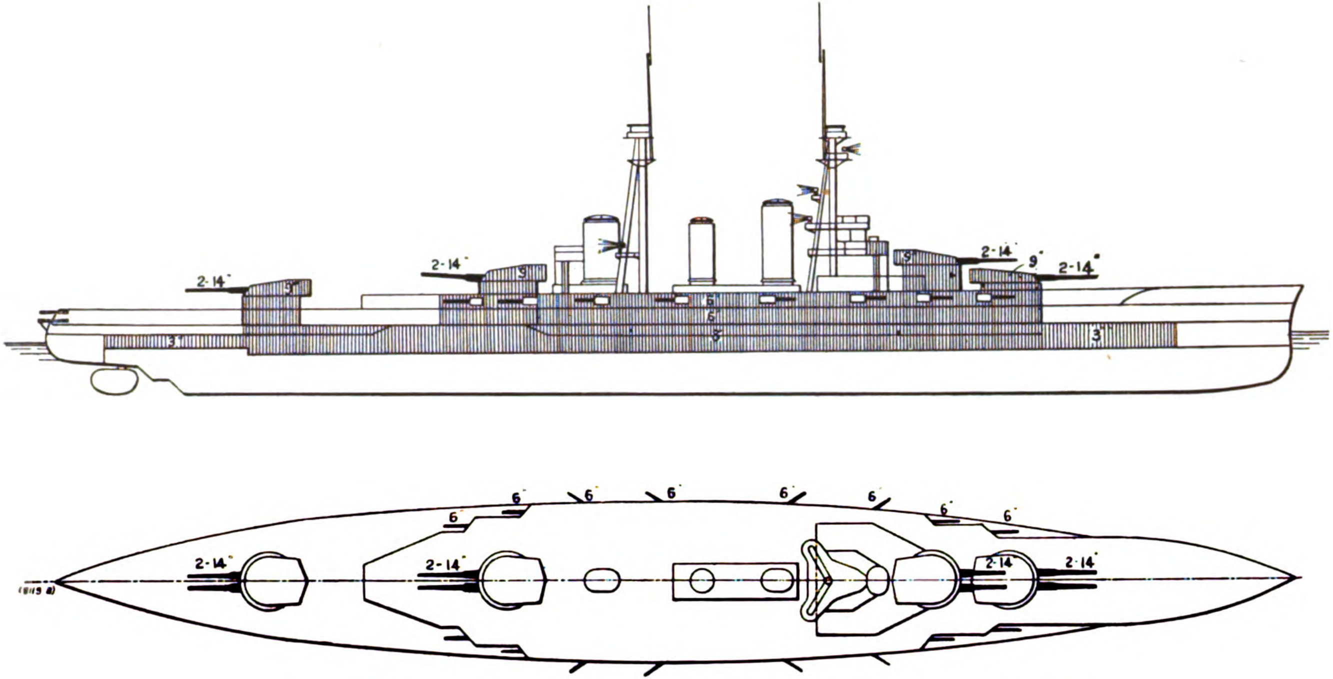


Length (extreme), 673 ft. ; Length B.P., 630 ft. ; Speed, 22·5 knots ; 29,330 tons ; Completed, 1915-17.
Armament, 12—14-in. ; 16—6-in. ; 4—3-in. A.A. ; 6 submerged 21-in. torpedo tubes.

JAPAN.

BATTLE-CRUISERS.

Kongo.

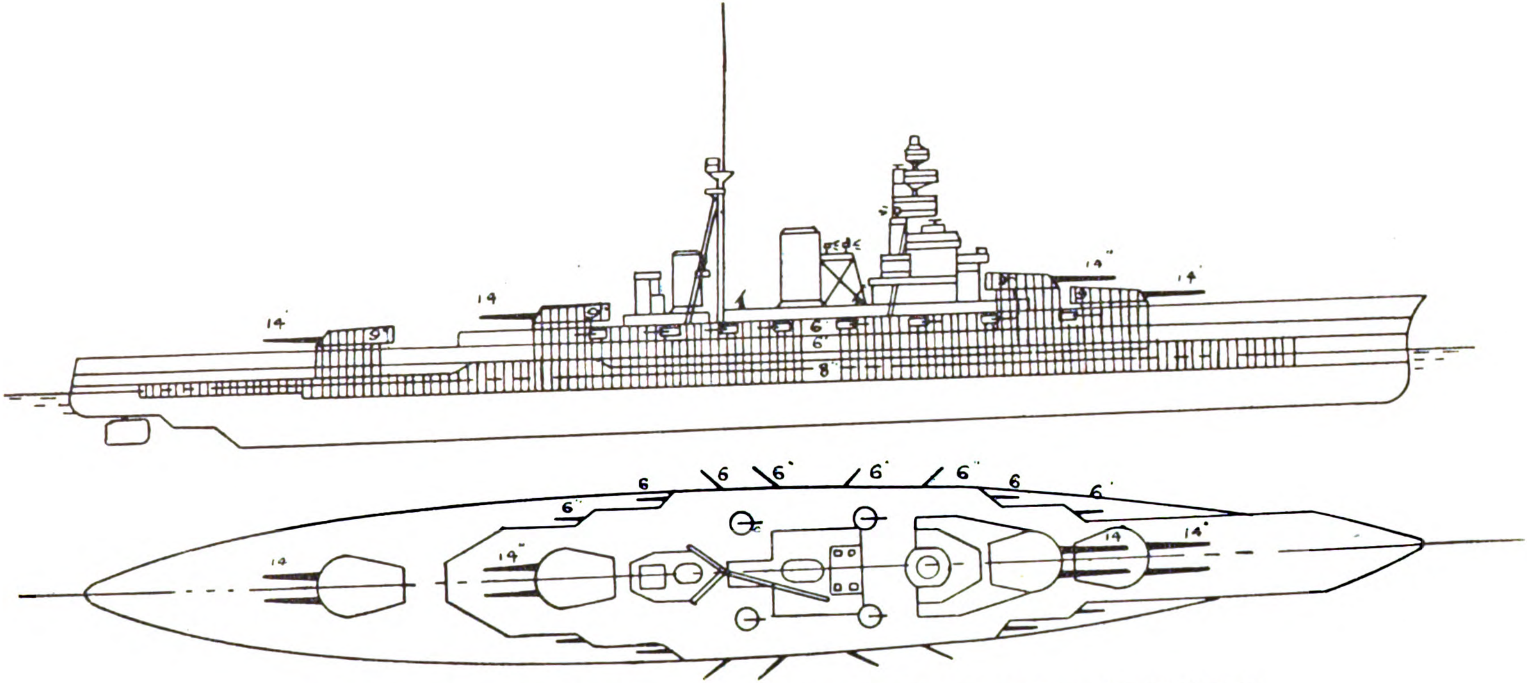


Length (extreme), 704 ft.; Length B.P., 653 ft. 6 ins.; Speed, 27·5 knots; 26,330 tons; Completed, 1913.
Armament, 8—14-in.; 16—6-in.; 4—12-pr. A.A.; 8 submerged 21-in. torpedo tubes.

JAPAN.

BATTLE-CRUISERS.

Hiyei. **Haruna.** **Kirishima.**



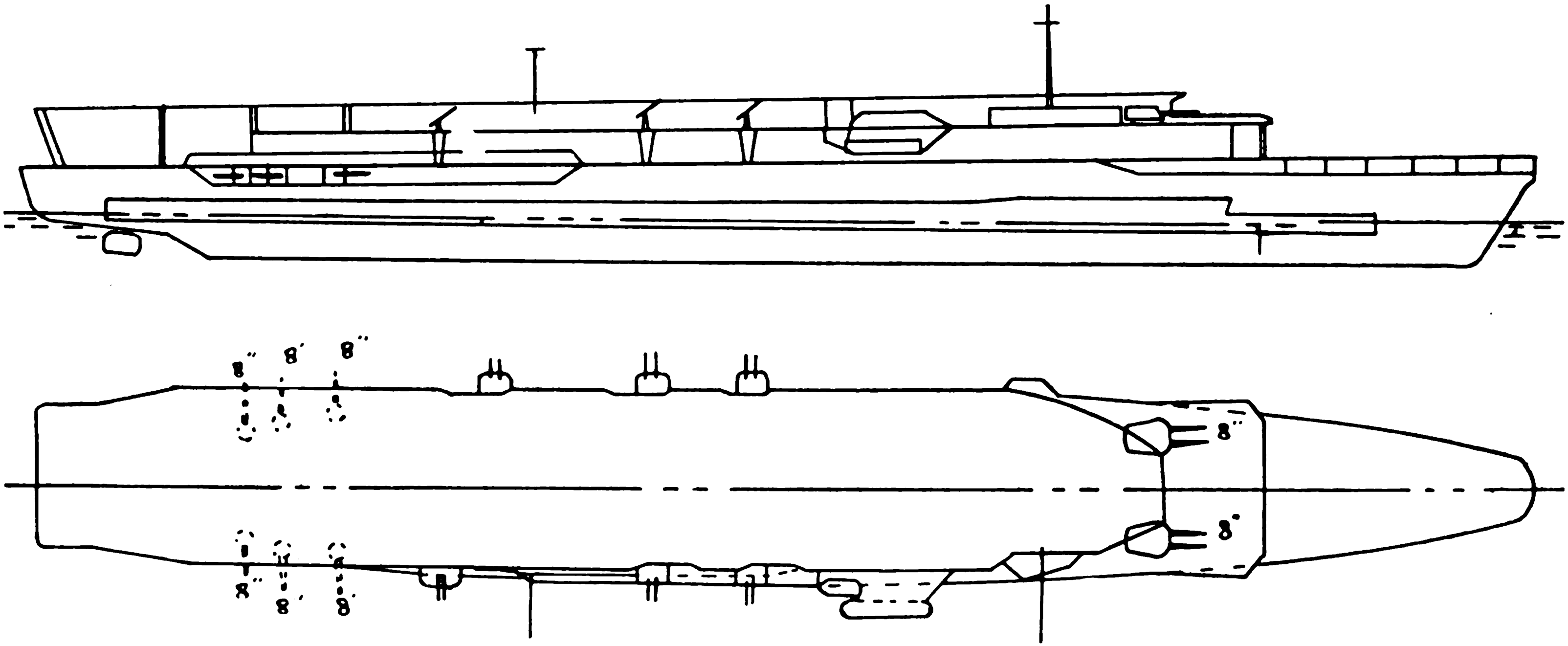
Length (extreme), 704 ft.; Speed, 27·5 knots; Haruna, 29,330 tons; Hiyei, Kirishima, 26,330 tons; Completed, 1914-15.

Armament, 8—14-in.; 16—6-in.; 4—3-in. A.A.; 8 submerged 21-in. torpedo tubes.

JAPAN.

AIRCRAFT CARRIER.

Akagi.

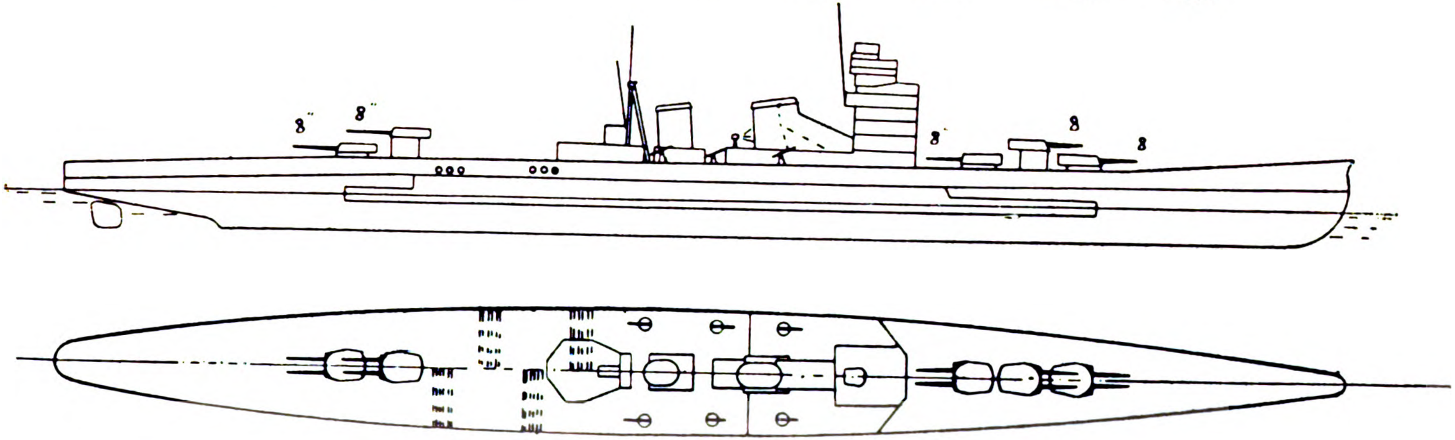


Length (between perpendiculars), 763 ft.; 26,900 tons; Speed, 28·5 knots.
Armament, 10—8-in.; 12—4·7-in. A.A. Carries 66 planes.

JAPAN.

LIGHT CRUISERS.

Nachi. Myoko. Ashigara. Haguro. Atago. Takao. Chokai. Maya.

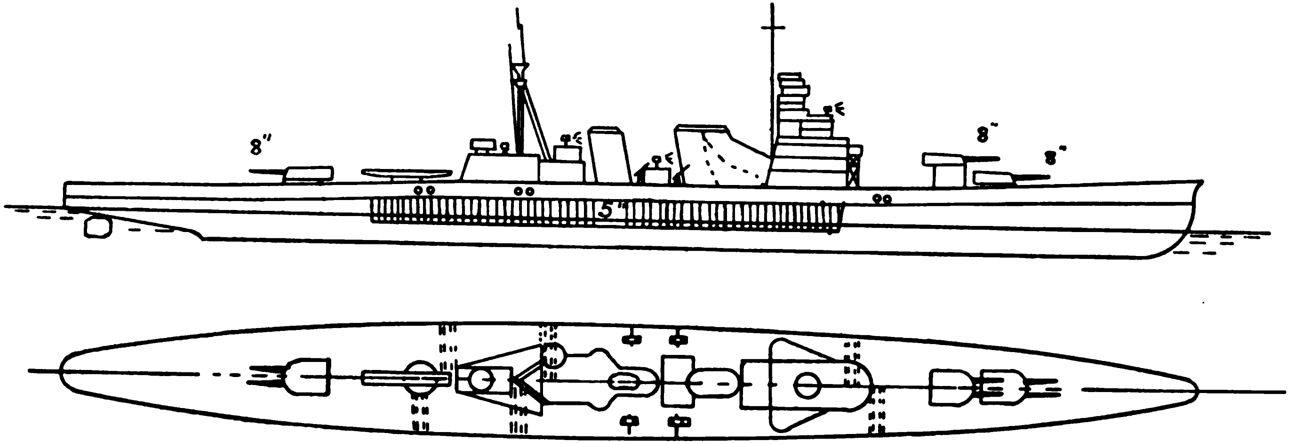


Length (between perps.), 630 ft. ; 10,000 tons ; speed, 33 knots.
Armament, 10—8-in. ; 6—4·7-in. A.A. ; 12 torpedo tubes.

JAPAN.

CRUISERS.

Aoba. Kinugasa.

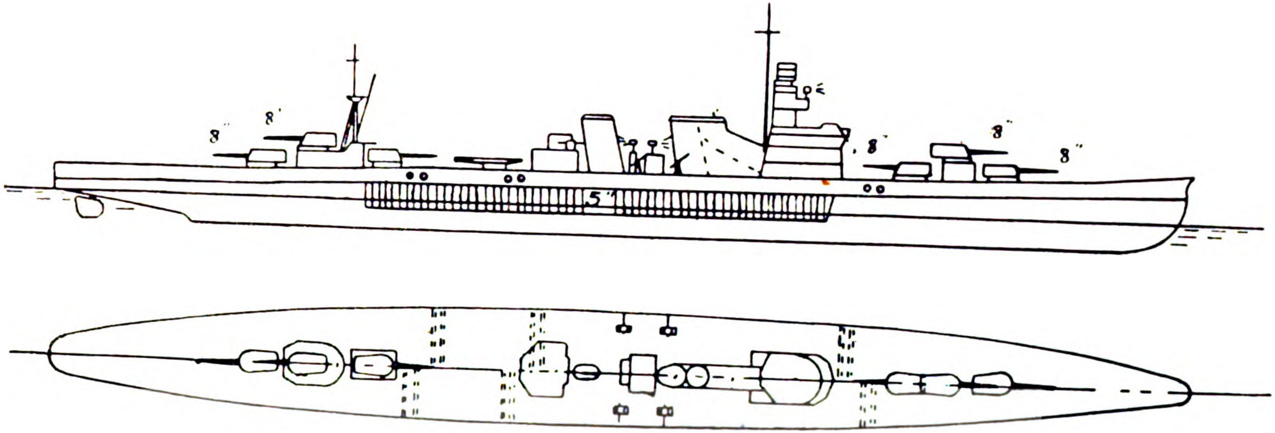


Length (extreme), 595 ft. ; 7,100 tons ; Speed, 33 knots.
Armament, 6—8-in. ; 4—4·7-in. A.A. ; 12 torpedo tubes.

JAPAN.

LIGHT CRUISERS.

Furutaka. **Kako.**

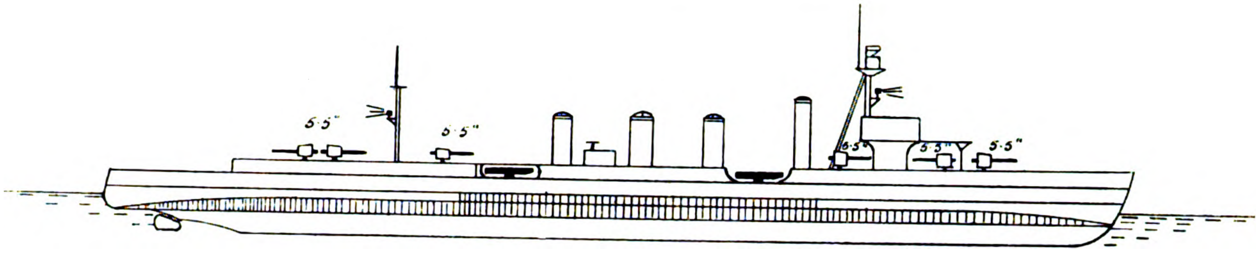


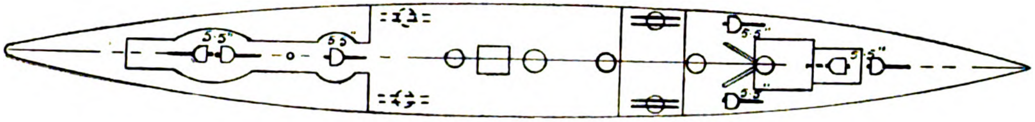
Length (extreme), 595 ft.; 7,100 tons; Speed, 33 knots.
Armament, 6—8-in.; 14—3-in. A.A.; 12 above-water torpedo tubes.

JAPAN.

LIGHT CRUISERS.

Naka. **Abukuma.** **Sendai.** **Jintsu ***





Length (extreme), 535 ft. ; Speed, 33 knots ; 5,195 tons.

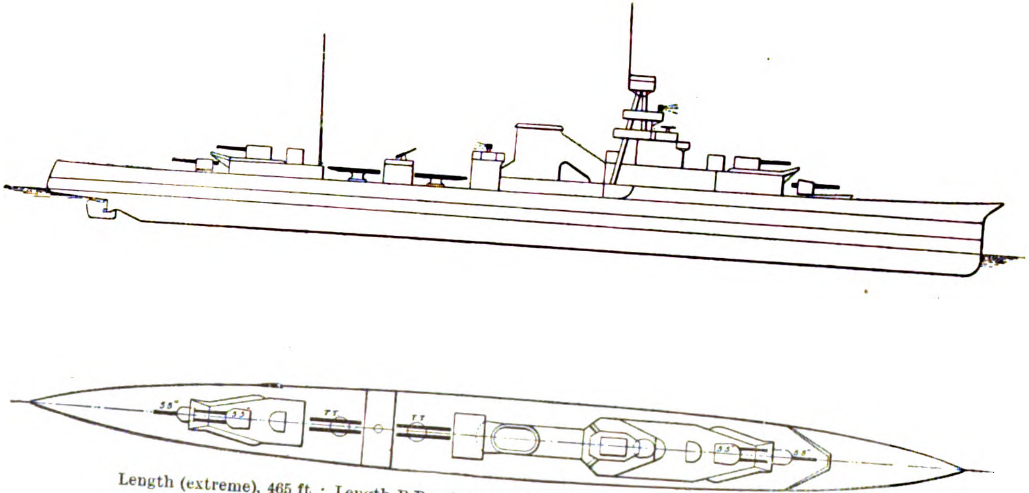
Armament, 7—5·5-in. ; 3—3-in. A.A. ; 1 Pom Pom A.A. ; 4 twin torpedo tubes.

*** Bow of Jintsu has been modified to give more flair.**

JAPAN.

LIGHT CRUISER.

Yubari.



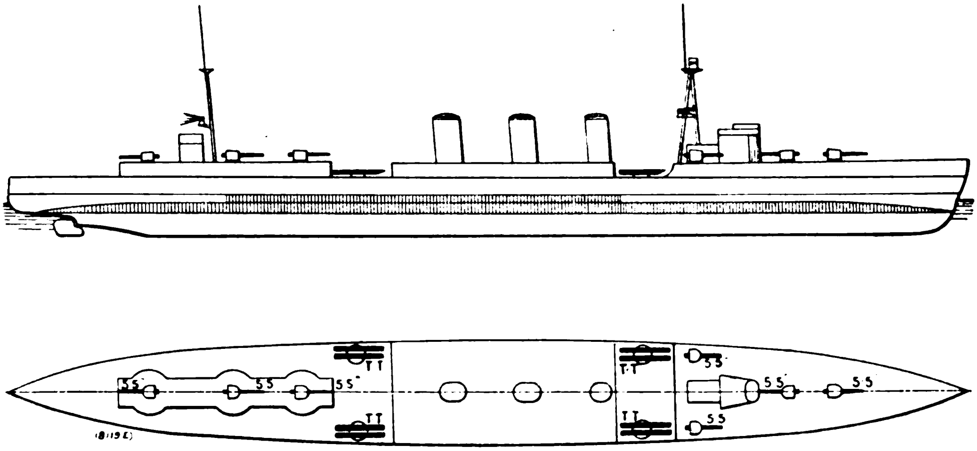
Length (extreme), 465 ft.; Leugth B.P., 435 ft.; 2,890 tons; Speed, 33 knots. Completed, 1923.
Armament, 6—5·5-in. 2—3-in. A.A.; 2 M.; 2 twin 21-in. torpedo tubes.

JAPAN.

LIGHT CRUISERS.

***{Isudzu. Nagara.** ***{Natori. Yura.** ***Kinu.**

O-I. **Kiso.** **Kitakami** **Tama** **Kuma.**

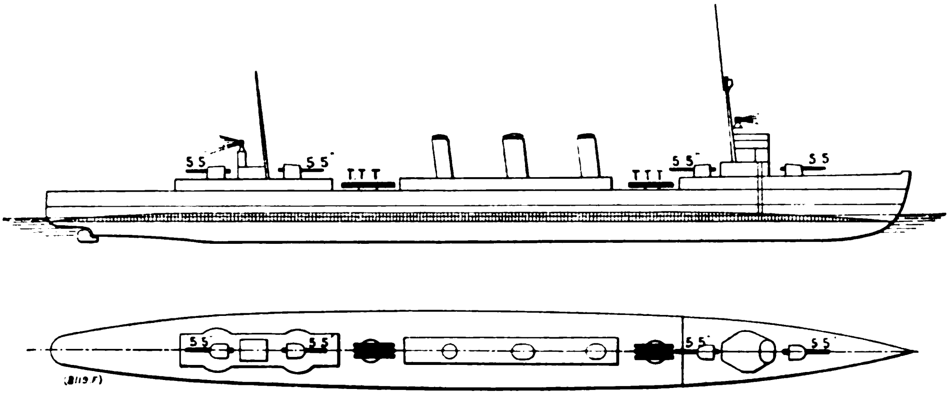


Length (extreme), 535 ft.; Length B.P., 500 ft.; Speed, 33 knots; 5,100 tons; Completed, 1920–21.
Armament, 7—5·5-in.; 2—3-in. A.A.; 4 twin above-water 21-in torpedo tubes.

* Plans apply generally to these vessels except that aircraft hangar is arranged in bridge structure. The displacement is 70 tons higher than O-I, etc. These vessels were completed, 1922–23.

LIGHT CRUISERS.

Tatsuta. **Tenryu.**

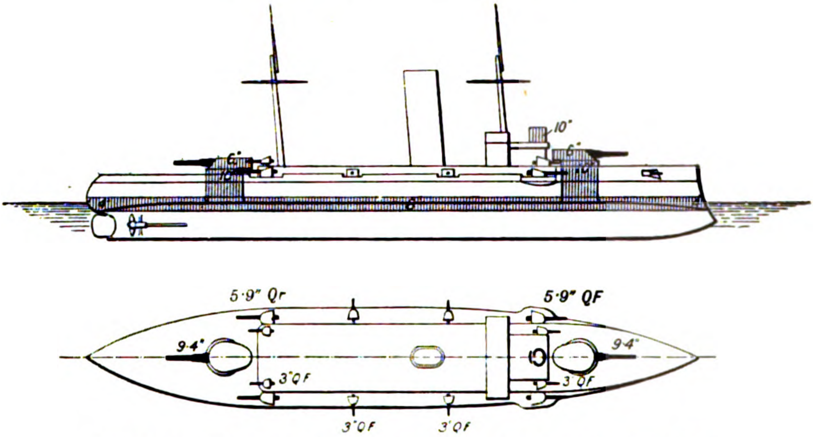


Length (extreme), 468 ft.; Speed, 31 knots; 3,230 tons; Completed, 1919.
Armament, 4—5·5-in.; 1—12-pr. A.A.; 2 triple above-water torpedo tubes.
Fitted for Minelaying.

NETHERLANDS.

COAST DEFENCE SHIPS.

Hertog Hendrik. **Marten Tromp.**

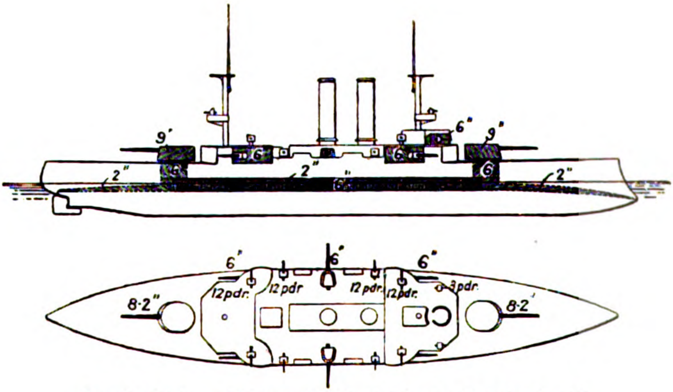


Length, 317-330 ft. ; 5000—5216 tons ; Speed, 16 knots ; Completed, 1903—1906.
Armament : Hertog Hendrik : 2—9·4-in. ; 6—5·9-in. ; 4—2·9-in. ; 4 or 6 small.
Marten Tromp : 2—9·4-in. ; 4—5·9-in. 8—2·9-in. ; 6 small.

NORWAY.

COAST DEFENCE SHIPS.

Norge. **Eidsvold**

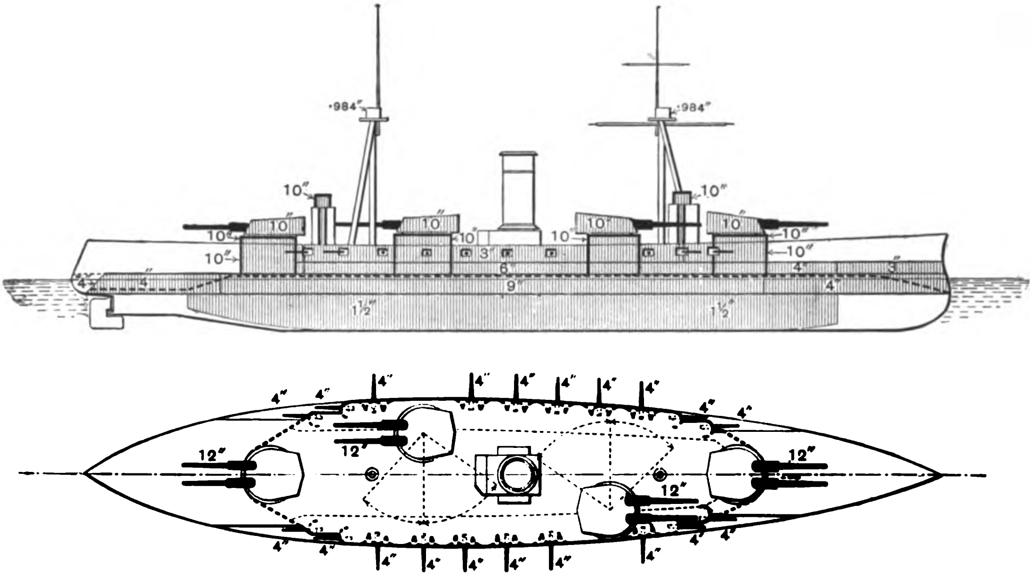


Length, 310 ft. ; 4,166 tons ; Speed, 16·9 knots ; Completed, 1901.
Armament, 2—8·2-in. ; 6—6-in. ; 8—12-pr. ; 6 small.

SPAIN.

BATTLESHIPS.

Alfonso XIII. **Jaime I.**

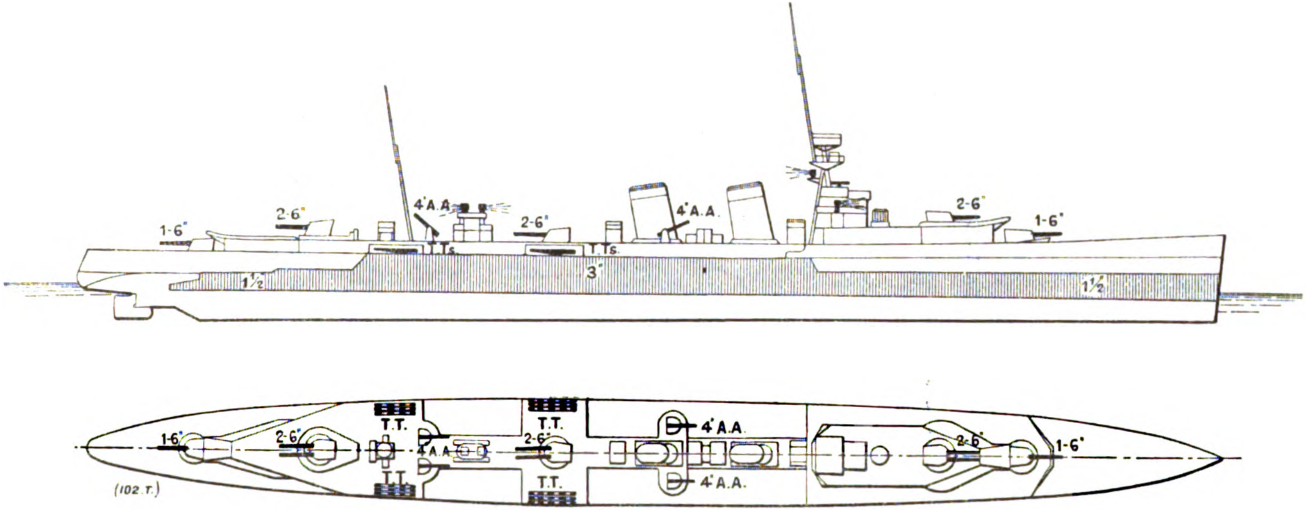


Length (extreme), 459 ft. ; Length W.L., 435 ft. ; 15,460–15,700 tons ; Speed, 19·5 knots to 20·2 knots ; Completed, 1913–1916.
Armament, 8—12-in. ; 20—4-in. ; 6 small.

SPAIN.

LIGHT CRUISERS.

Principe Alfonso. **Almirante Cervera.** **Miguel de Cervantes.**

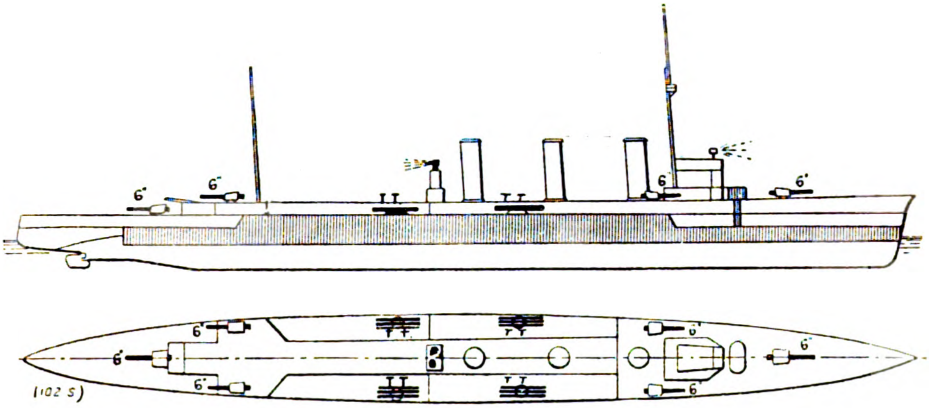


Length (extreme), 579 ft. 6 ins.; Length, B.P., 545 ft.; 7,850 tons; Speed, 33 knots.
Armament, 8—6-in.; 4—4-in. A.A., 2—3 pr., 4 triple above-water torpedo tubes (21-in. torpedoes).

SPAIN.

LIGHT CRUISERS.

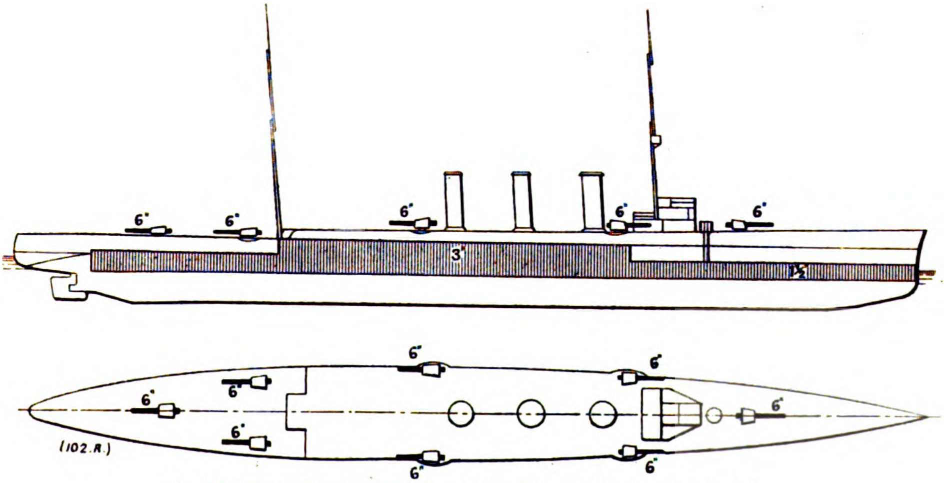
Don Blas Lezo. **Mendez Nuñez.**



Length (extreme), 462 ft. ; Length B.P., 439 ft. ; 4,650 tons ; Speed, 29 knots. Completed, 1924.
Armament, 6—6-in. ; 4—3-pr. A.A. ; 4 M. ; 4 above-water triple torpedo tubes (21-in. torpedoes).

LIGHT CRUISER.

Reina Victoria Eugenia



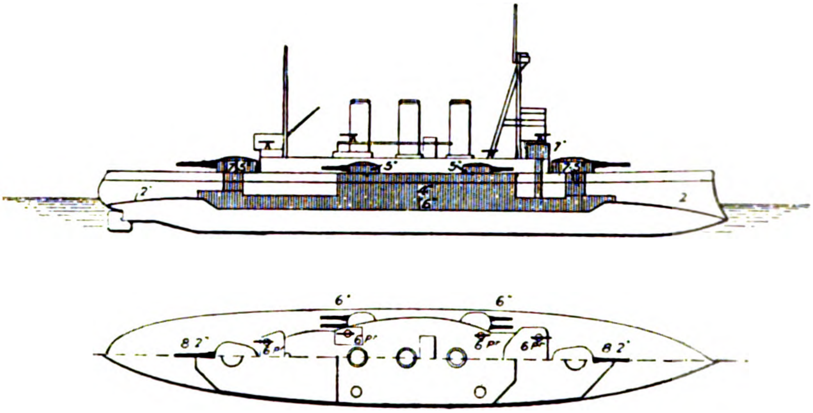
Length (extreme), 462 ft. ; 6,130 tons ; Speed, 25½ knots ; Completed, 1922.
Armament, 9 *—6-in. ; 1—12-pr. ; 4—3-pr. A.A. ; 4 M. ; 1 L. ; 4 torpedo tubes.

* NOTE.—There should be two 6-in. guns abreast forward instead of one on the centre line as shown.

SWEDEN.

BATTLESHIP.

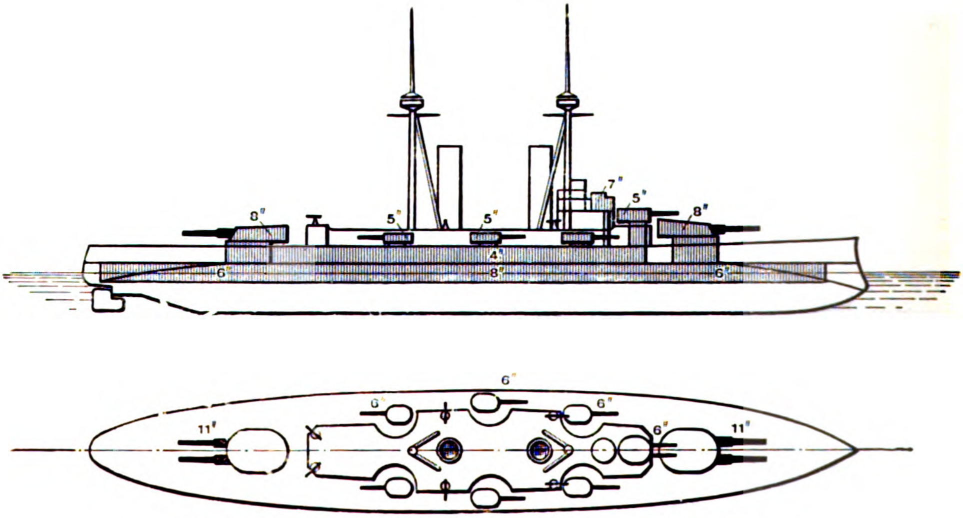
Oscar II.



Length, 313·6 ft. ; 4,584 tons ; Speed, 18 knots ; Completed, 1907.
Armament, 2—8·2-in. ; 8—6-in. ; 8—6-pr. ; 1—1-pr.

ARMOURED CRUISERS.

Drottning Victoria.

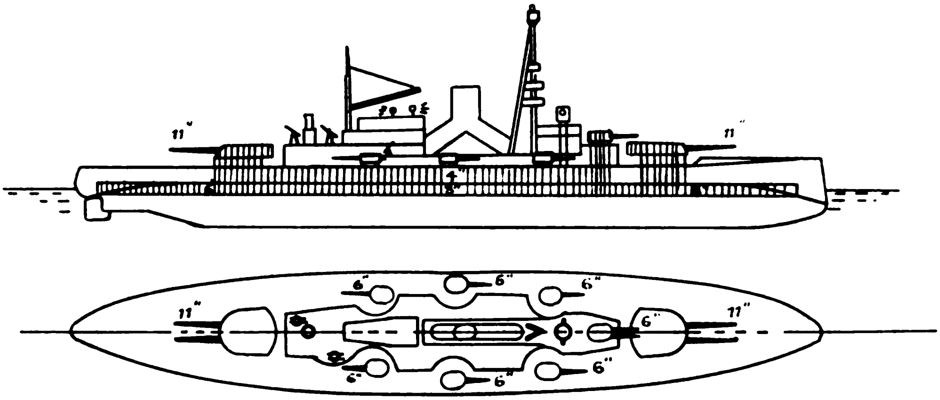


Length, 396·7 ft. ; 7,500 tons ; Speed, 22 knots ; Completed, 1917–1922.
Armament, 4—11-in. ; 8—6-in. ; 6—12-pr. ; 4 small.

SWEDEN

ARMOURED CRUISERS.

Gustav V. **Sverige.**

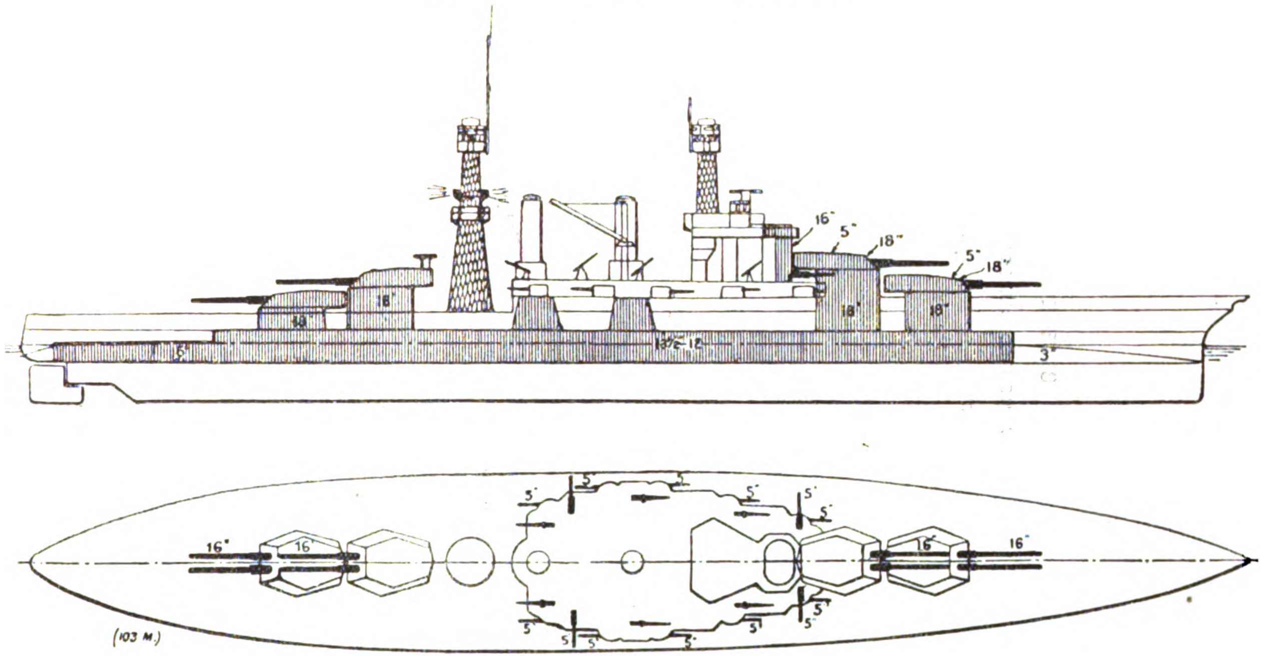


Length, 396·7 ft. ; Gustav, 7,500 tons ; Sverige, 6,990 tons ; Speed, 22 knots ; Completed, 1917–1921.
Armament, 4—11-in. ; 8—6-in. ; 6—3-in.

UNITED STATES.

BATTLESHIPS.

Colorado. **Maryland.** **West Virginia.**



Length (extreme), 624 ft.; Length W.L., 600 ft.; Speed, 21 knots; 32,600 tons; Maryland, completed, 1921; Colorado and West Virginia, completed, 1923.

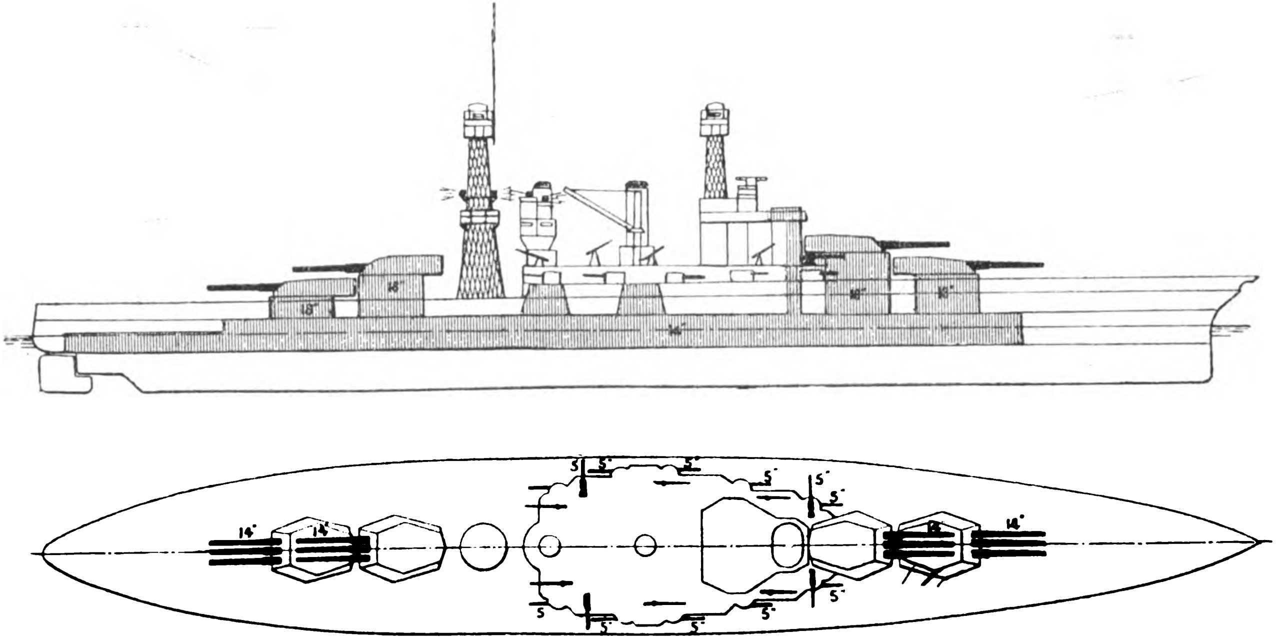
Armament, 8—16-in.; 12—5-in.; 8—5-in. A.A.; 4—6-pr.; 2 submerged 21-in. torpedo tubes.

Catapult mounted right aft on Quarter Deck.

UNITED STATES.

BATTLESHIPS.

California. **Tennessee.**

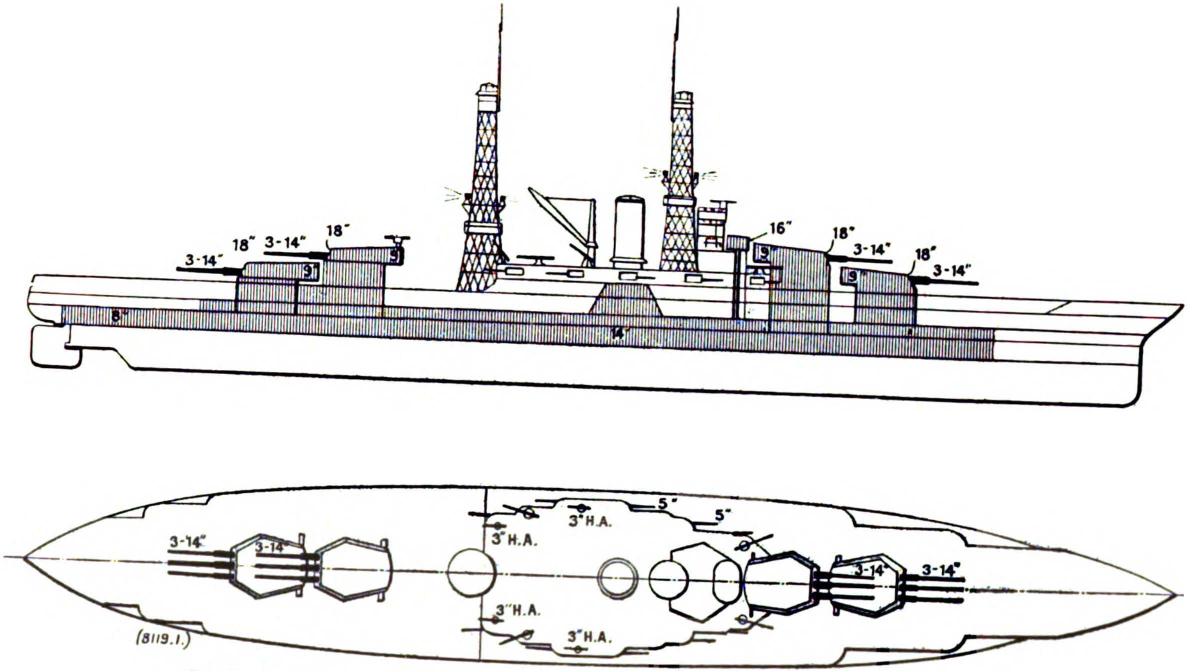


Length (extreme), 624 ft.; Length W.L., 600 ft.; Speed, 21 knots; 32,300 tons; Completed, 1920-21.
Armament, 12—14-in.; 12—5-in.; 8—5-in. A.A.; 4—6-pr.: 2 submerged 21-in. torpedo tubes.
Catapult has been fitted right aft on Quarter Deck.

UNITED STATES.

BATTLESHIPS.

Idaho. **New Mexico.** **Mississippi.**



Length (extreme), 624 ft. Length W.L., 600 ft.; Speed, 21 knots; 32,000 tons; Completed, 1917-19.
Armament, 12—14-in.; 12—5-in.; 8—14-pr. A.A.; *4—6-pr.; 2 submerged 21-in. torpedo tubes.

* Idaho, 4—3-pr.

Catapult mounted right aft on Quarter Deck.

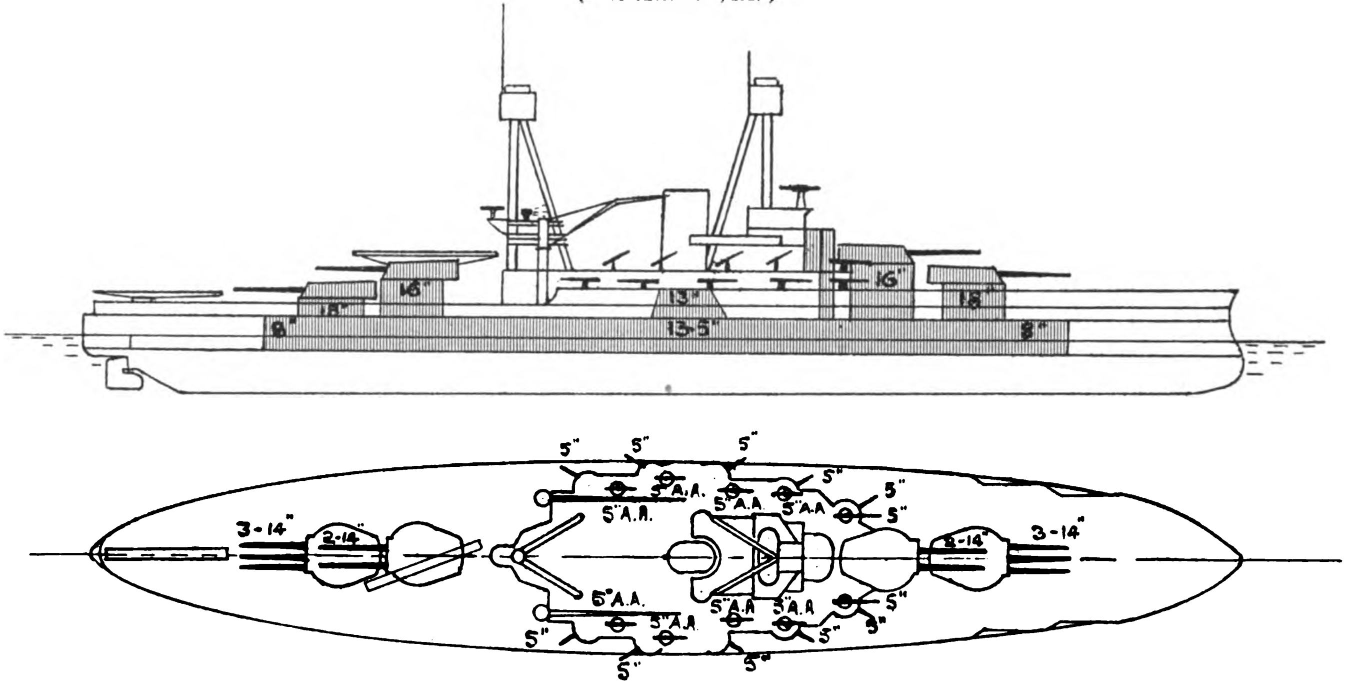
Mississippi has an additional turret catapult.

UNITED STATES.

BATTLESHIPS.

Nevada. **Oklahoma**

(As reconstructed, 1927.)



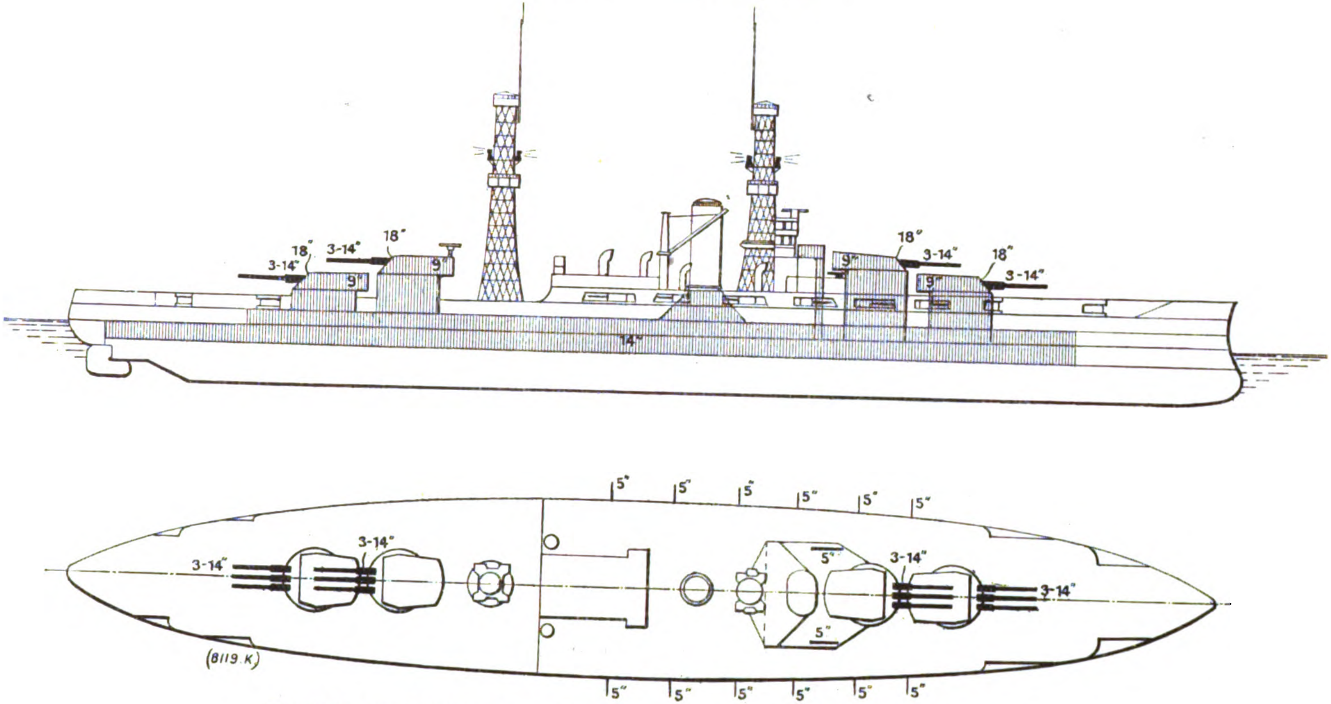
Length (extreme), 583 ft.; Length W.L., 575 ft.; Speed, 20·5 knots; 27,500 tons.

Armament, 10—14-in.; 12—5-in.; 8—5-in. A.A.; 4 smaller guns. 2 submerged 21-in. torpedo tubes; 1 catapult; 3 aeroplanes.

UNITED STATES

BATTLESHIPS.

Arizona. **Pennsylvania.**

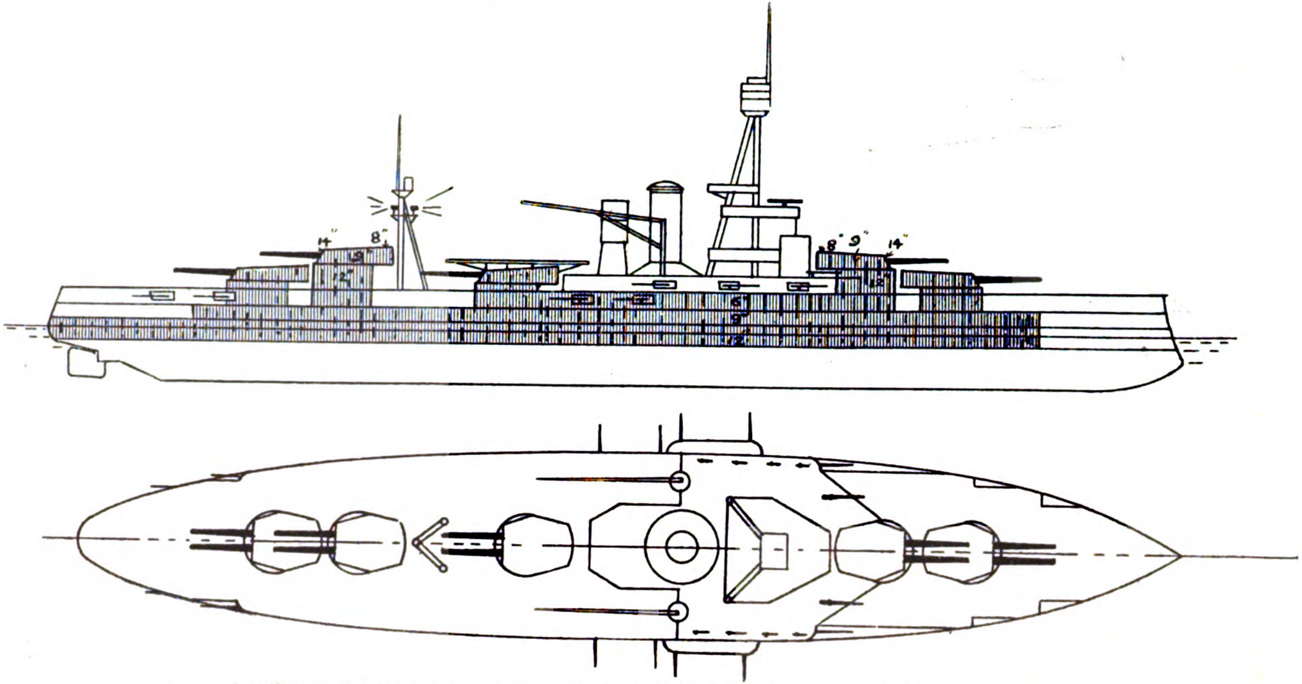


Length (extreme), 608 ft. ; Length B.P., 596 ft. ; Speed, 21 knots ; 31,400 tons ; Completed, 1916.
Armament, 12—14-in. ; 14—5-in. ; 8—3-in. A.A. ; 4—3-pr. ; 2 submerged 21-in. torpedo tubes.
Catapult mounted right aft on Quarter Deck.

UNITED STATES.

BATTLESHIPS.

New York. **Texas.**

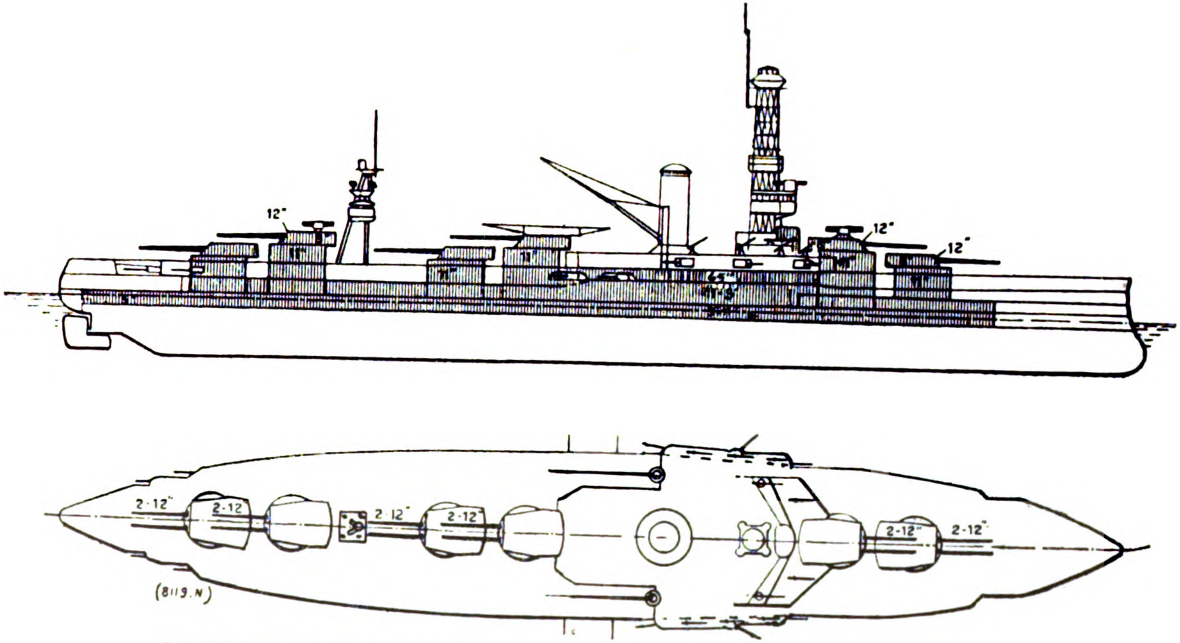


Length (extreme), 573 ft. ; **Length** W.L., 565 ft. ; **Speed, 21 knots** ; 29,600 tons ; Completed, 1914.
Armament, 10—14-in. ; **16—5.** in. ; 8—3-in. **A.A.** ; **4—3-pr.** ; 2—1-pr. ; 2 M. ; 1 catapult.

UNITED STATES.

BATTLESHIPS.

Arkansas. **Wyoming.**



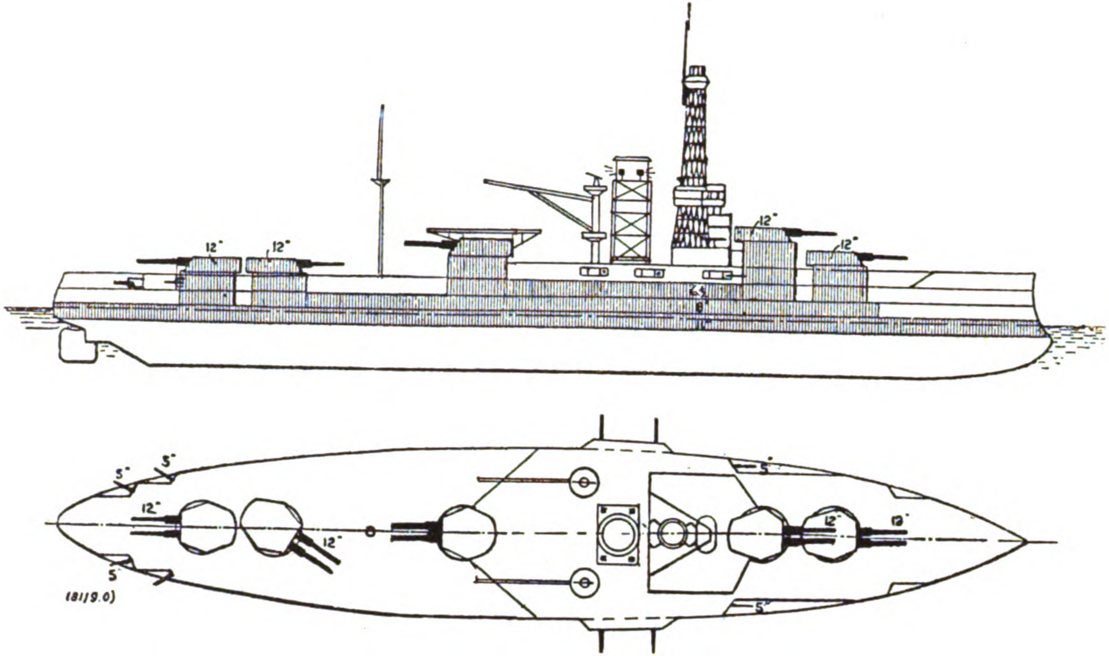
Length (extreme), 562 ft. ; Length W.L., 554 ft. ; Speed, 20·5 knots ; 28,500 tons ; Completed, 1912.
Armament, 12—12-in. ; 16—5-in. ; 8—3-in. A.A. ; 4—6* or 3-pr. ; 2—1-pr. ; 2 M. ; 1 catapult.

* In Wyoming.

UNITED STATES.

BATTLESHIPS.

Utah. **Florida**



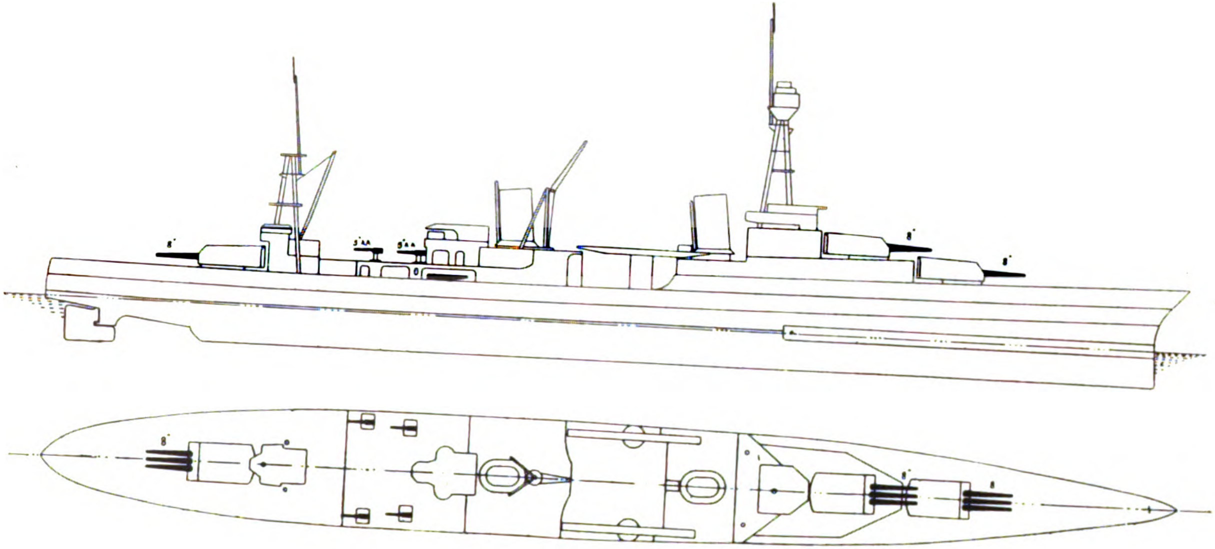
Length (extreme), 521 ft. 6 ins. ; Length W.L., 510 ft. ; Speed, 20·75 knots ; 21,825 tons ; Completed, 1911.
*Armament, 10—12-in. 12—5-in. ; 8—3-in. A.A. ; 4—3-pr. ; 4 M. ; 1 catapult.

* Florida, 4—6-pr.

UNITED STATES.

CRUISERS.

Northampton. **Chester.** **Louisville.** **Chicago.** **Houston.** **Augusta.**

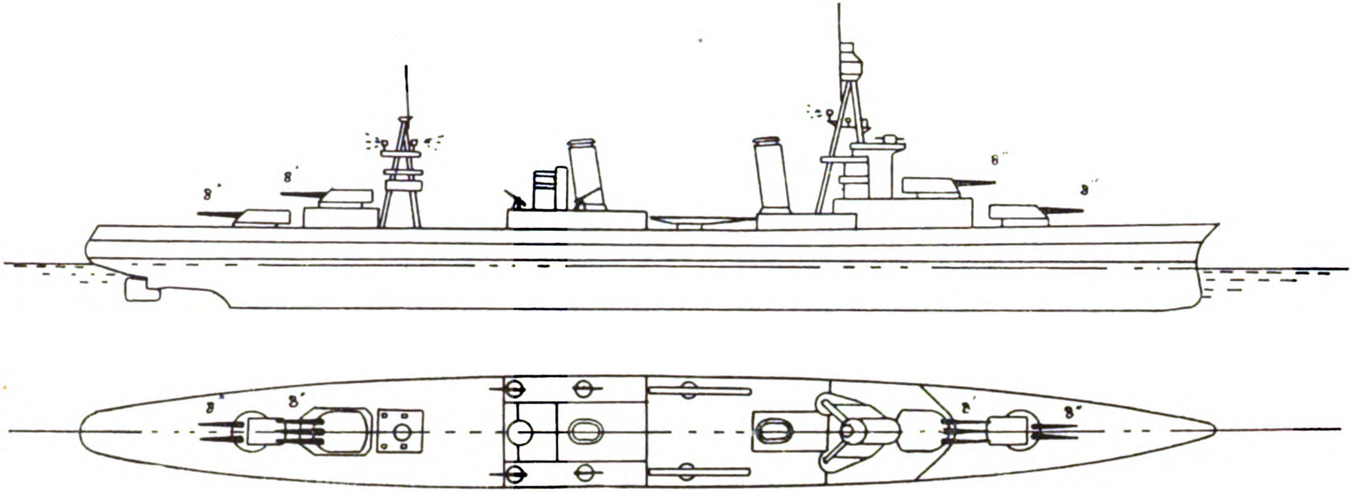


Length (extreme), 600 ft. ; 10,000 tons ; Speed, 32·7 knots.
Armament, 9—8-in. ; 4—5-in. A.A. ; 4 seaplanes.

UNITED STATES.

CRUISERS.

Salt Lake City. Pensacola.

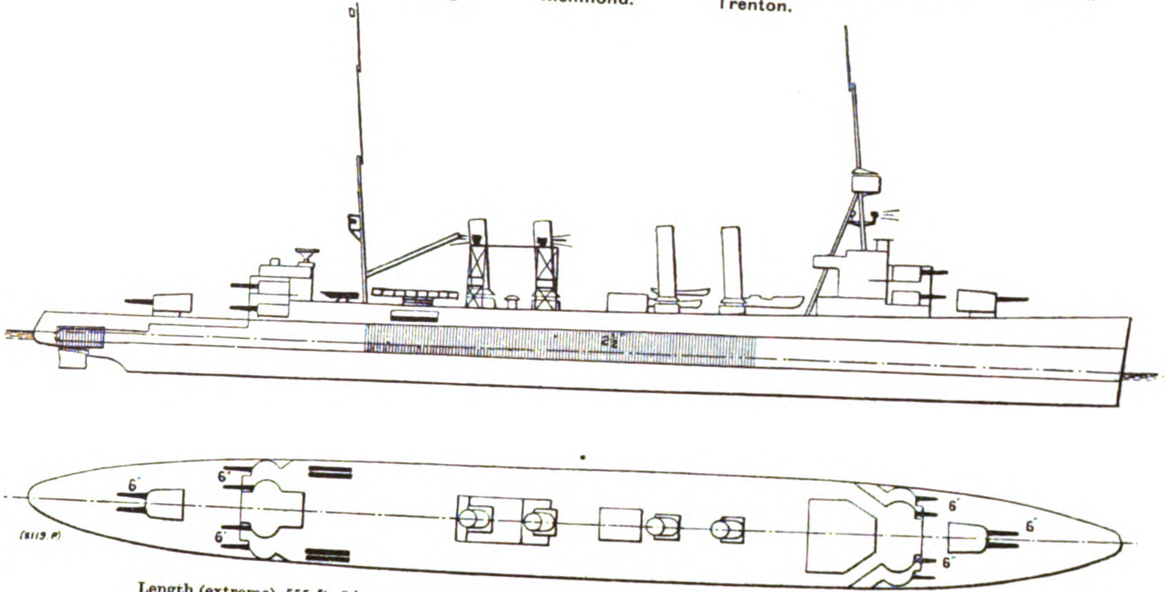


Length (**extreme**), 585½ ft.; 10,000 tons; Speed, 32½ knots.
Armament, 10—**8-in.**; 4—5-in. A.A.; 2—3-pr.; 2 triple torpedo tubes.

UNITED STATES.

SCOUT CRUISERS.

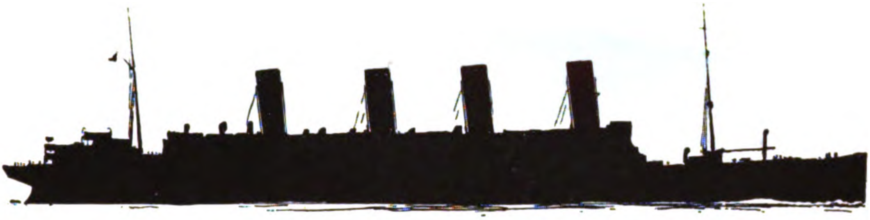
Cincinnati. Concord. Detroit Raleigh. Marblehead. Richmond. Memphis. Trenton. Milwaukee. Omaha.



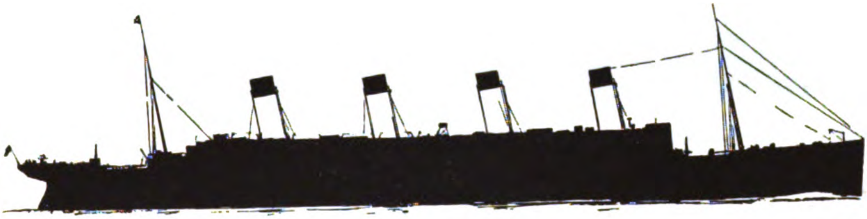
Length (extreme), 555 ft. 6 ins. ; Length W.L., 550 ft. ; Speed, 33·7 knots ; 7,500 tons. Completed in 1923-25.
Armament 12–6-in. ; 4—3-in. A.A. ; 2—3-pr. ; 2 twin and 2 triple above-water 21-in. torpedo tubes.

PROFILES OF
MERCHANT SHIPS.

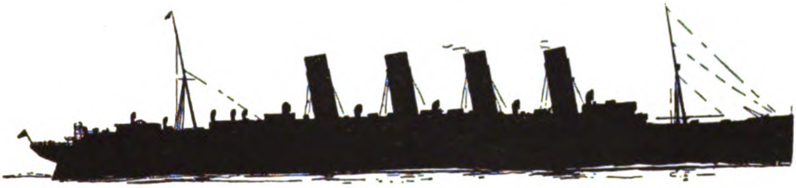
MERCHANT SHIPS.



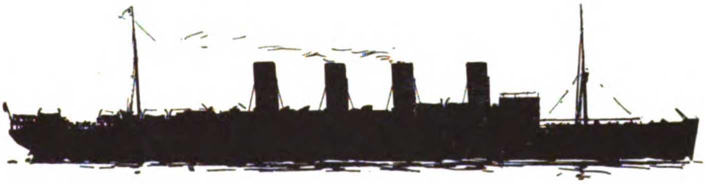
AQUITANIA. **Cunard.** Length, 868 ft. 7 ins. ; Gross Tonnage, 45,647 ;
Funnels : Red, Black Tops.



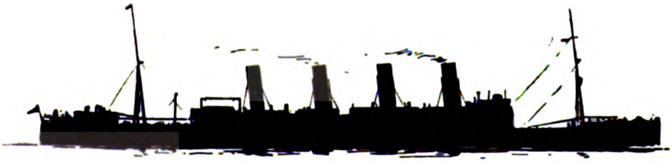
OLYMPIC. **White Star.** Length, 852 ft. 5 ins. ; Gross Tonnage, 46,439 ;
Funnels : Buff, Black Tops.



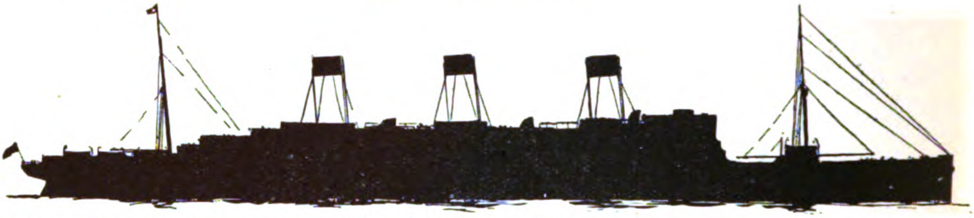
MAURETANIA. **Cunard.** Length, 762 ft. 2 ins. ; Gross Tonnage, 30,696 ;
Funnels : Red, Black Tops.



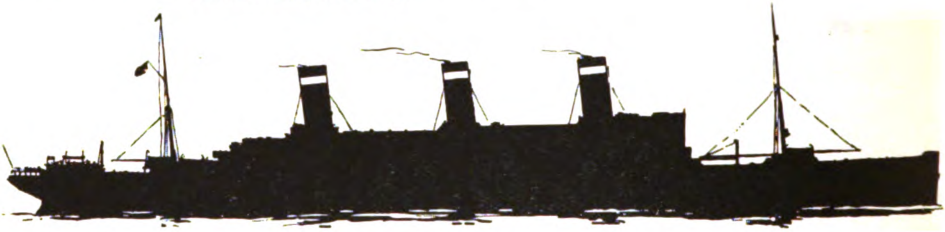
FRANCE. **Cie. Générale Transatlantique.** Length, 689 ft. 2 ins. ; Gross Tonnage, 23,769 ;
Funnels : Red, Black Tops.



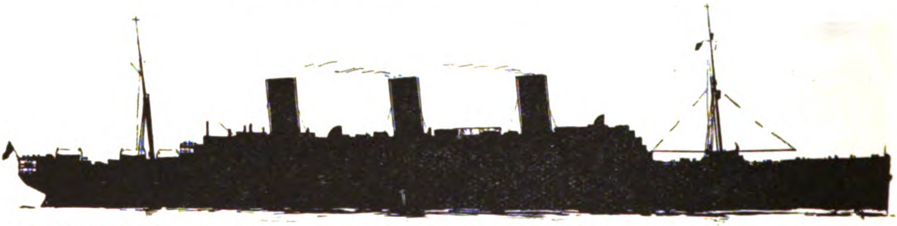
ARUNDEL CASTLE. **WINDSOR CASTLE.** **Union Castle.** Length, 630 ft. 5 ins. and 632 ft. 4 ins. ;
Gross Tonnage, 19,023 and 18,967 ;
Funnels : Red, Black Tops.



MAJESTIC. White Star. Length, 915 ft. 5 ins.; Gross Tonnage, 56,621;
Funnels: Buff, Black Tops.

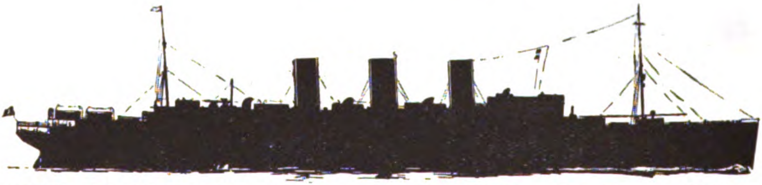


LEVIATHAN. United States Lines. Length, 907 ft. 6 ins.; Gross Tonnage, 59,957;
Funnels: Red, White Band, Blue Tops.

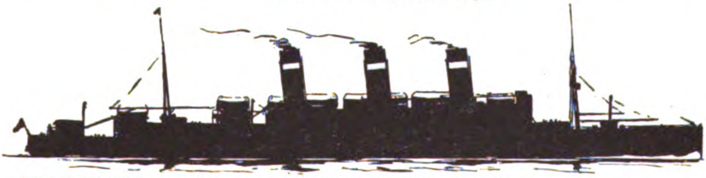


BERENGARIA. Cunard. Length, 883 ft. 6 ins.; Gross Tonnage, 52,226;
Funnels: Red, Black Tops.

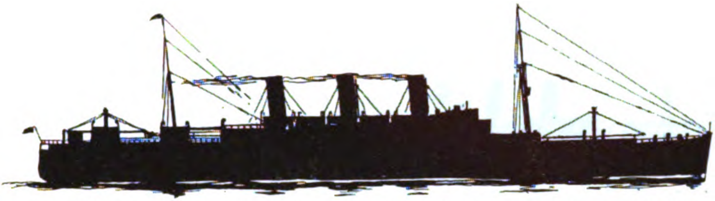
ILE DE FRANCE. Cie. Générale Transatlantique. Length, 763 ft. 7 ins.; Gross Tonnage, 43,153;
Funnels: Red, Black Tops.



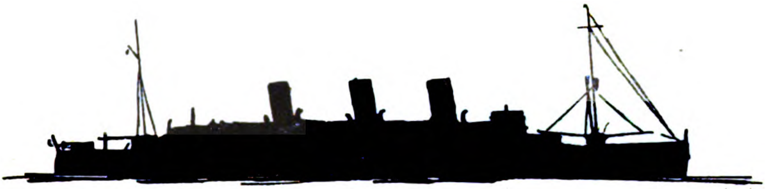
PARIS. Cie. Générale Transatlantique. Length, 735 ft. 4 ins.; Gross Tonnage, 34,569;
Funnels: Red, Black Tops.



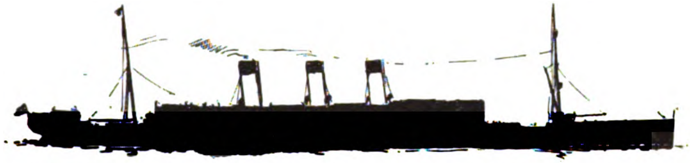
BELGENLAND. Red Star. Length, 670 ft. 4 ins.; Gross Tonnage, 27,132;
Funnels: Black, White Band.



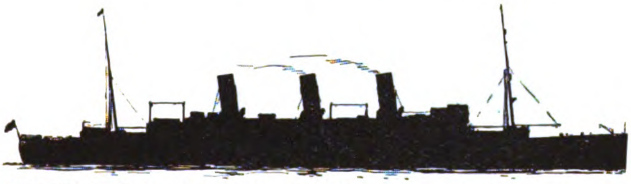
STATENDAM. Holland-Amerika. Length, 670 ft. 4 ins.; Gross Tonnage, 29,511; Funnels: Buff, White Band between Two Green.



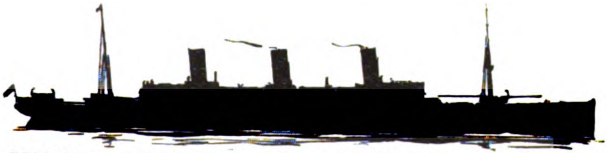
EMPRESS OF JAPAN. Canadian Pacific. Length, 644 ft.; Gross Tonnage, 26,032; Funnels, Buff.



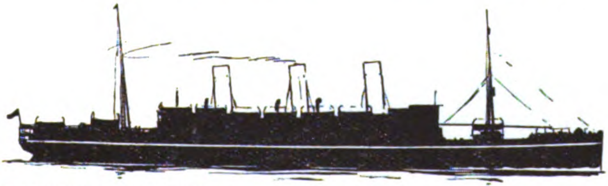
CAP POLONIO. Hamburg-South Amerika. Length, 637 ft. 8 ins.; Gross Tonnage, 20,517; Funnels: White, Red Tops.



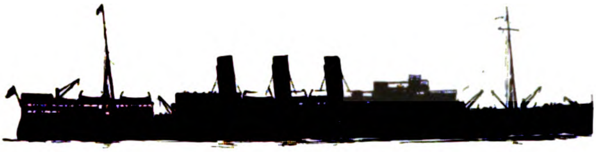
EMPRESS OF CANADA. Canadian Pacific. Length, 627 ft.; Gross Tonnage, 21,517; Funnels: Yellow.



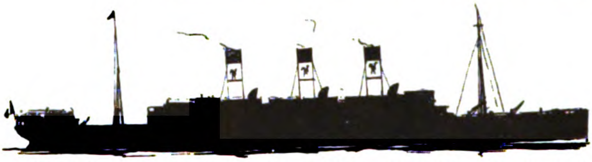
RELIANCE. RESOLUTE. Hamburg-Amerika Line. Length, 590 ft. 4 ins.; Gross Tonnage, 19,802 and 19,692; Funnels: Yellow, with Black, White and Red Bands at Top.



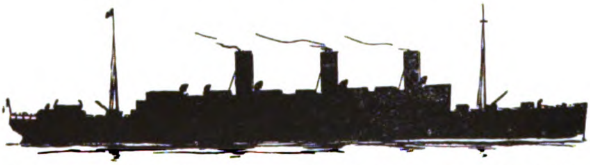
EMPRESS OF AUSTRALIA. Canadian Pacific. Length, 589 ft. 9 ins.; Gross Tonnage, 21,833; Funnels: Yellow.



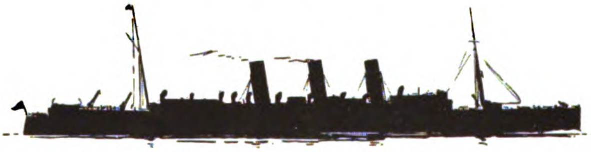
NALDERA. **Peninsular and Oriental.** Length, 580 ft. 9 ins.; Gross Tonnage, 16,088;
NARKUNDA. „ „ „ Length, 581 ft. 4 ins.; Gross Tonnage, 16,572;
Funnels: Black.
(The Narkunda is similar to the Naldera but has raised forecastle.)



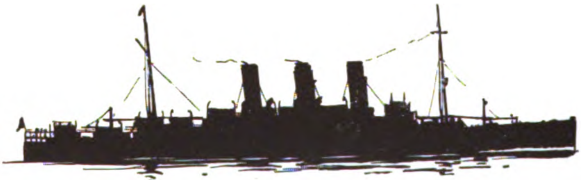
LUTETIA. **Cie. Sud Atlantique.** Length, 579 ft.; Gross Tonnage, 14,783;
Funnels: Buff, Black Tops. Cockerel on side.



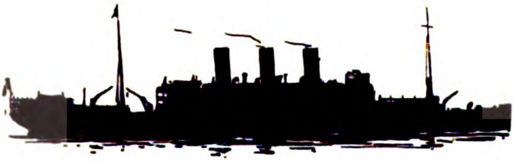
MASSILIA. **Cie. Sud Atlantique.** Length, 577 ft. 1 in.; Gross Tonnage, 15,363;
Funnels: Buff, Black Tops. Cockerel on sides.



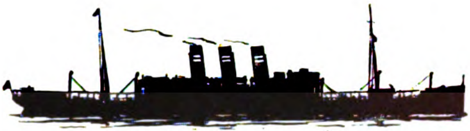
EMPRESS OF ASIA. EMPRESS OF RUSSIA. **Canadian Pacific.**
Length, 570 ft. 1 in. Gross Tonnage, 16,909 and 16,810;
Funnels: Yellow.



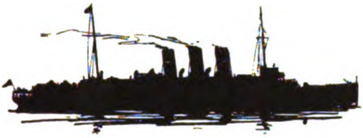
TRANSYLVANIA. CALEDONIA. **Anchor Henderson.**
Length, 552 ft. 4 ins. and 553 ft.; Gross Tonnage, 16,923 and 17,046;
Funnels: Black.



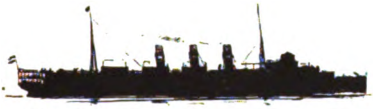
CHAMPOLLION. MARIETTE PACHA. **Messageries Maritimes.**
Length, 495 ft. 1 in. and 508 ft. 5 ins.; Gross Tonnage, 12,263 and 12,239;
Funnels: Black.



TAIREA. TAKLIWA. TALAMBA. British India S.N. Co.
Length, 449 ft. 6 ins.; Gross Tonnage, 8,000;
Funnels: Black, Two White Bands, Black Tops.



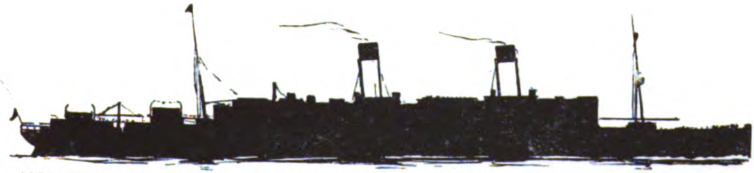
PRINCESS KATHLEEN. PRINCESS MARGUERITE. Canadian Pacific.
Length, 350 ft.; Gross Tonnage, 6,000;
Funnels: Yellow, Black Top.



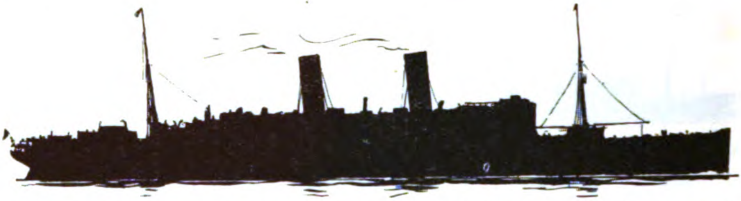
CIUDAD DE BUENOS AIRES. Argentine S.N. Co. CIUDAD DE MONTE VIDEO. Uruguayan S.N. Co. Length, 350 ft.; Gross Tonnage, 3,864;
Funnels: Yellow, Black Tops.

PRINCESS ELAINE. Canadian Pacific. Length 291 ft.; Gross Tonnage, 2,000;
Funnels Yellow, Black Top.

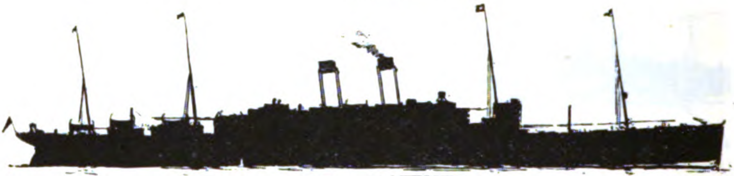
BREMEN. EUROPA. Norddeutscher Lloyd. Length, 898 ft. 7 ins. and 890 ft 2 ins.;
Gross Tonnage, 51,656 and 49,746;
Funnels: Yellow.



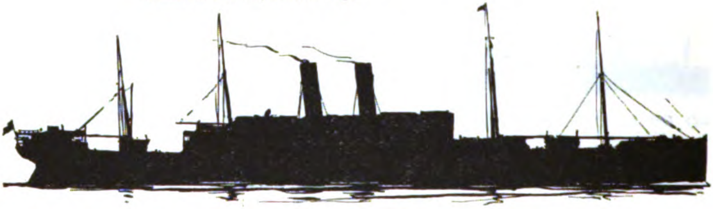
HOMERIC. White Star. Length, 751 ft.; Gross Tonnage, 34,351;
Funnels: Buff, Black Tops.



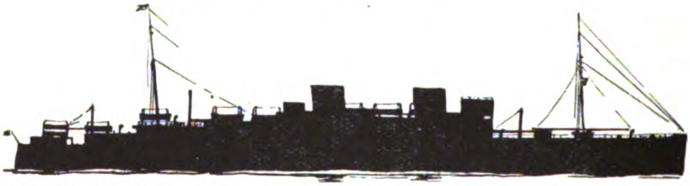
COLUMBUS. **Norddeutscher Lloyd.** Length, 749 ft. 6 ins.; Gross Tonnage, 32,354; Funnels: Yellow.



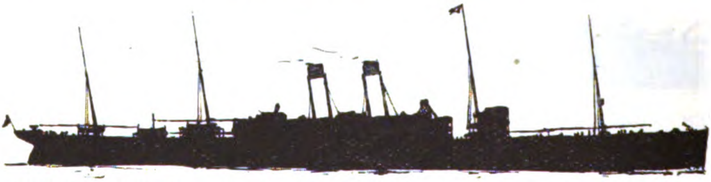
ADRIATIC. **BALTIC.** **White Star.** Length, 709 ft. 2 ins.; Gross Tonnage, 24,563 and 23,884; Funnels: Buff, Black Tops.



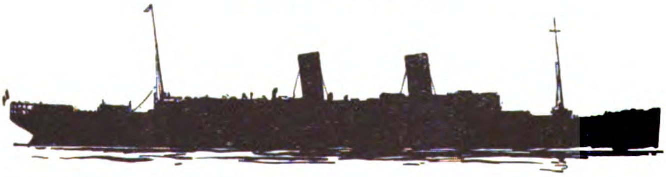
GEORGE WASHINGTON. **United States Lines.** Length, 699 ft.; Gross Tonnage, 23,788; Funnels: Red, White Band, Blue Top.



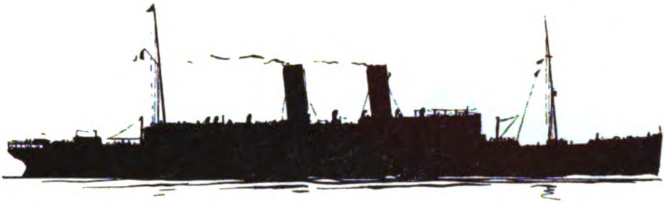
M.S. BRITANNIC. **White Star.** Length, 683 ft. 6 ins.; Gross Tonnage, 26,943; Funnels: Buff, Black Tops.



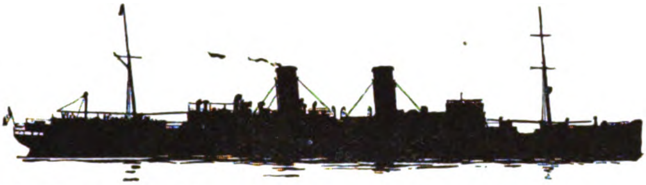
CEDRIC. **White Star.** Length, 680 ft. 9 ins.; Gross Tonnage, 21,227; Funnels: Buff, Black Tops.



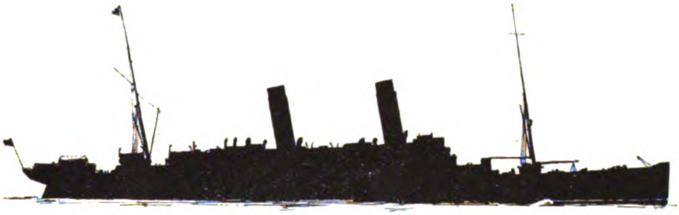
M.S. AUGUSTUS. **Navigazione Generale Italiana.** Length, 666 ft. 3 ins.; Gross Tonnage, 32,650; Funnels: Black, White Band.



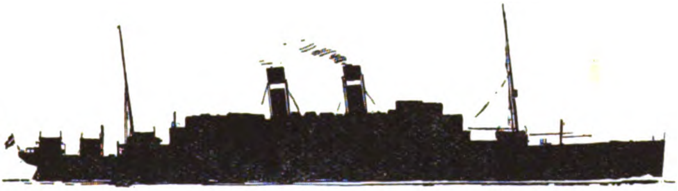
ROMA. Navigazione Generale Italiana. Length, 664 ft. 7 ins. ; Gross Tonnage, 32,583 ;
Funnels : Black, White Band.



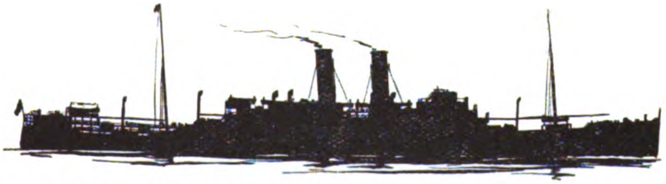
CONTE GRANDE. CONTE BIANCAMANO. Lloyd Sabaudo.
Length, 652 ft. 2 ins. and 650 ft. 9 ins ; Gross Tonnage, 25,661 and 24,416 ;
Funnels : Yellow, White Band between Two Narrow Blue.



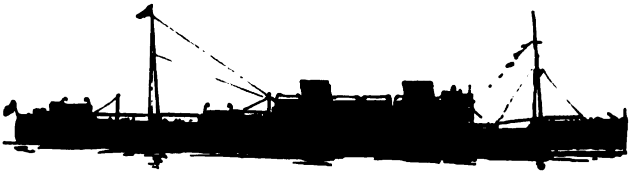
CARONIA. CARMANIA. Cunard. Length, 650 ft. ; Gross Tonnage, 19,782 and 19,566 ;
Funnels : Red, Black Tops.



ROTTERDAM. Holland-Amerika. Length, 650 ft. ; Gross Tonnage, 24,149 ;
Funnels : Buff, Two Green Bands with White Band between, Buff Tops.

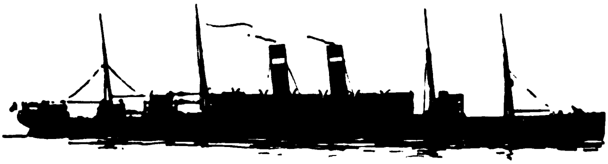


ORFORD. ORAMA. ORONSAY. ORONTES. OTRANTO. Orient. Length, 632 ft. ;
Gross Tonnage, 20,000 ;
Funnels : Cream.

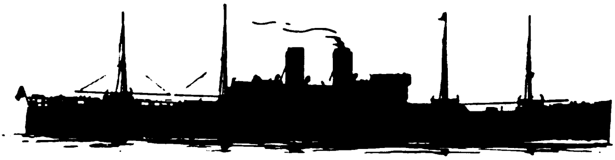


M.S. CARNARVON CASTLE. M.S. WINCHESTER CASTLE. Union Castle Line.
Length, 630 ft. 7 ins.; Gross Tonnage, 20,063;
Funnels: Red, Black Tops.

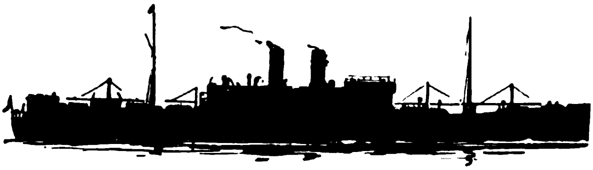
M.S. ALCANTARA. M.S. ASTURIAS. Royal Mail Steam Packet Co.
Length, 630 ft. 5 ins.; Gross Tonnage, 22,181 and 22,071;
Funnels: Buff.



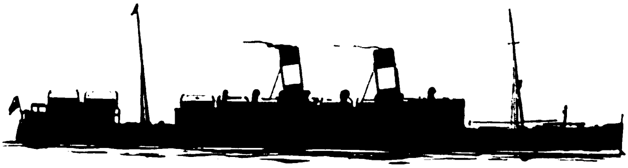
LAPLAND. Red Star. Length, 605 ft. 8 ins.; Gross Tonnage, 18,565;
Funnels: Black, White Band.



ALBERT BALLIN. DEUTSCHLAND. Hamburg-Amerika Line. Length, 602 ft. 4 ins.;
Gross Tonnage, 20,931 and 20,607:
Funnels: Yellow, with Black, White and Red Band at Top.

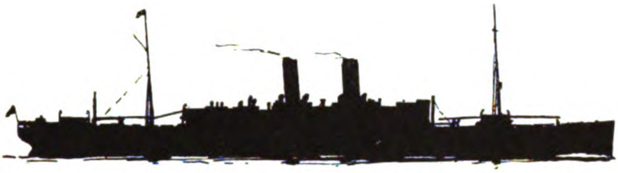


NEW YORK. HAMBURG. Hamburg-Amerika Line. Length, 602 ft. 5 ins.;
Gross Tonnage, 21,867 and 21,691;
Funnels: Yellow, with Black, White and Red Band at Tops.

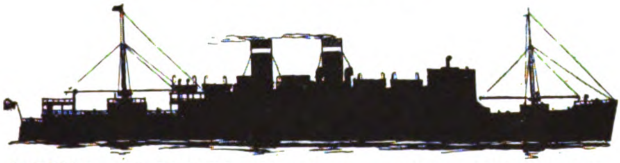


DUILIO. GIULIO CESARE. Navigazione Generale Italiana. Length, 602 ft. 4 ins.;
Gross Tonnage, 24,281 and 21,657;
Funnels: Black, Broad White Band.

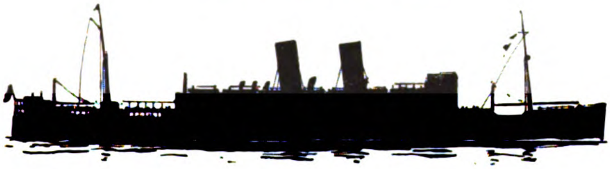
MOOLTAN. MALOJA. Peninsular and Oriental. Length, 600 ft. 8 ins.;
Gross Tonnage, 20,952 and 20,837;
Funnels: Black.



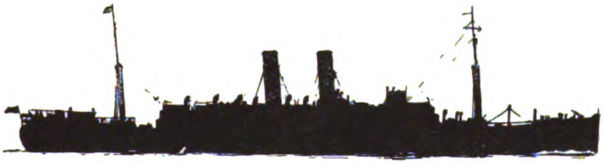
ALBERTIC. White Star. Length, 590 ft. 8 ins.; Gross Tonnage, 18,940;
Funnels: Buff, Black Tops.



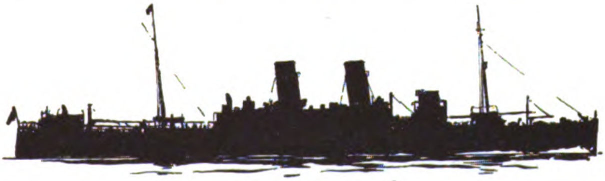
VIRGINIA. CALIFORNIA. Atlantic Transport Co. of West Virginia.
Length, 586 ft 4 ins. and 574 ft.; Gross Tonnage, 20,773 and 20,526;
Funnels: Black, White Band.



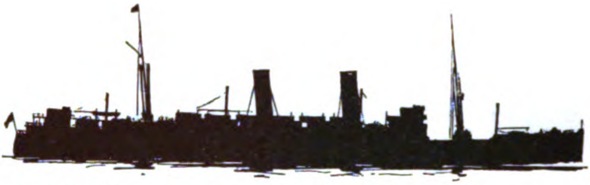
VICEROY OF INDIA. Peninsular and Oriental. Length, 582 ft. 7 ins.;
Gross Tonnage; 19,648;
Funnels: Black.



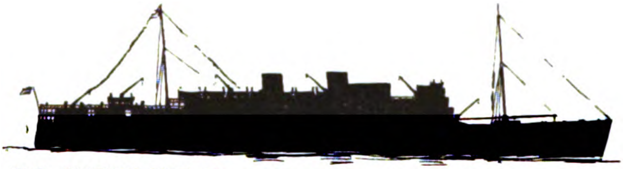
ORMONDE. Orient Line. Length, 580 ft. 5 ins.; Gross Tonnage, 14,853;
Funnels: Cream.



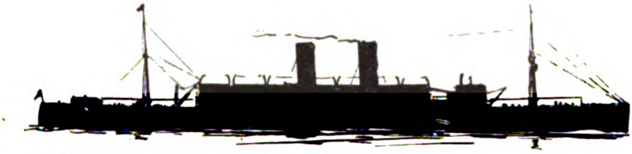
DUCHESS OF ATHOLL. DUCHESS OF BEDFORD. DUCHESS OF RICHMOND.
DUCHESS OF YORK. Canadian Pacific. Length, 580 ft. Gross Tonnage, 20,000;
Funnels Yellow.



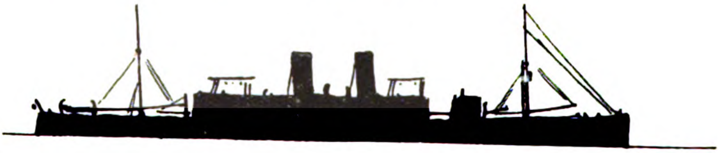
M.S. AORANGI. Union Steam Ship Co. of N.Z. Length, 580 ft.; Gross Tonnage, 17,491;
Funnels: Red, Black Tops.



M.S. MARNIX VAN ST. ALDEGONDE. JOHAN VAN OLDENBARNEVELT.
Stoomvaat Maatschappij Nederland. Length, 580 ft.;
Gross Tonnage, 18,000;
Funnels: Buff, Black Tops.

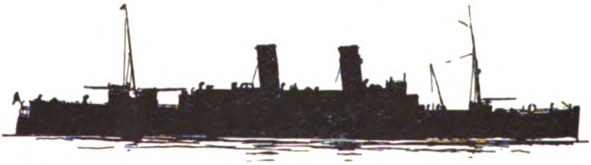


LAURENTIC. White Star. Length, 578 ft. 2 in.; Gross Tonnage, 18,724;
Funnels: Buff, Black Tops.

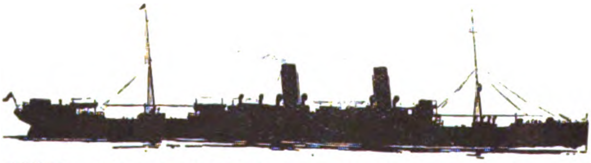


DORIC. White Star. Length, 575 ft. 5 ins.; Gross Tonnage, 16,484;
Funnel: Buff, Black Tops.

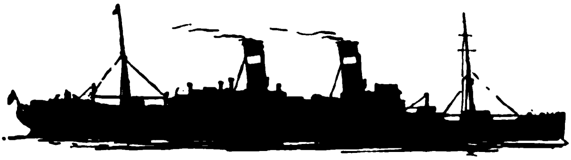
WESTERNLAND. PENNLAND. Red Star. Length, 575 ft. 5 ins.;
Gross Tonnage, 16,500 and 16,322;
Funnel: Black, White Band.



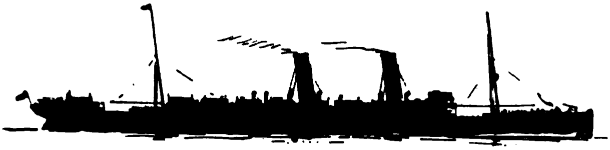
EMPRESS OF FRANCE. Canadian Pacific. Length, 571 ft. 4 ins.; Gross Tonnage, 18,357;
Funnels: Yellow.



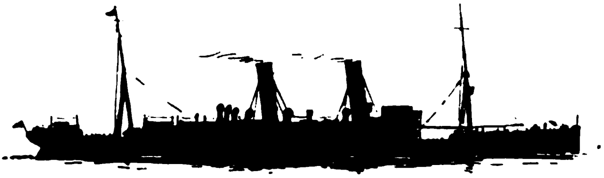
SAXON. WALMER CASTLE. Union Castle Line. Length, 570 ft. 5 ins.;
Gross Tonnage, 12,385 and 12,546;
Funnels: Red, Black Tops.



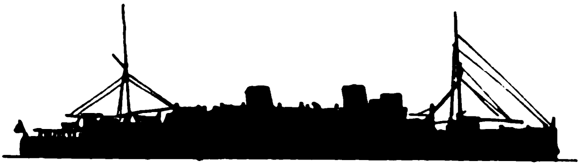
CONTE VERDE. CONTE ROSSO. Lloyd Sabaudo. Length, 570 ft. 2 ins.; Gross Tonnage, 18,765 and 17,048; Funnels: Yellow, White Band between Two Narrow Blue.



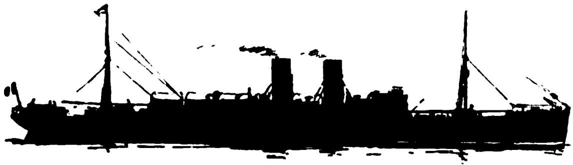
ARMADALE CASTLE. KENILWORTH CASTLE. Union Castle Line. Length, 570 ft. 1 in.; Gross Tonnage, 12,973; Funnels: Red, Black Tops.



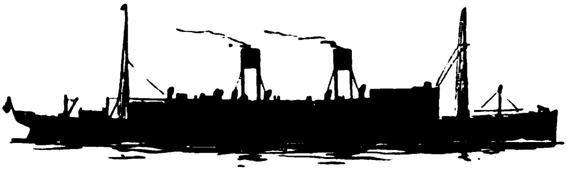
BALMORAL CASTLE. EDINBURGH CASTLE. Union Castle Line. Length, 570 ft.; Gross Tonnage, 13,361 and 13,330; Funnels: Red, Black Tops.



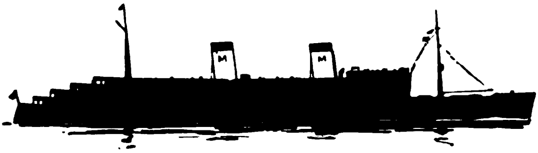
M.S. CHICHIBU MARU. M.S. TATSUTA MARU. M.S. ASAMA MARU. Nippon Yusen Kaisha. Length, 560 ft.; Gross Tonnage, 17,498 to 16,947. Funnels, Black, Broad White Band, Two Red on White.



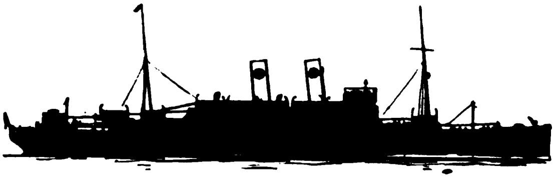
ROCHAMBEAU. Cie. Générale Transatlantique. Length, 559 ft.; Gross Tonnage 12,678; Funnels: Red, Black Tops.



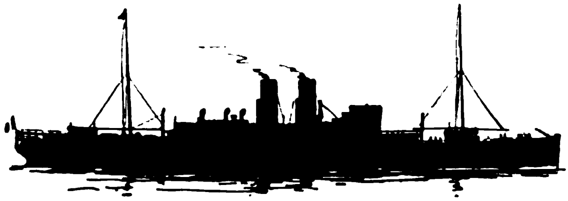
SHINYO MARU. Nippon Yusen Kaisha. Length, 558 ft.; Gross Tonnage, 13,026; Funnels: Black.



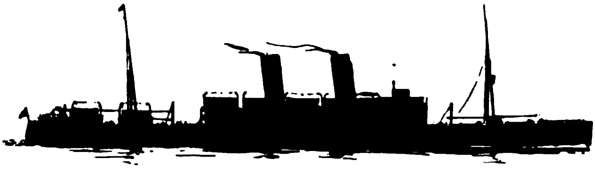
MALOLO. Matson Line. Length, 554 ft. ; Gross Tonnage, 17,232 ;
Funnels : Yellow, Black Tops, "M" on sides.



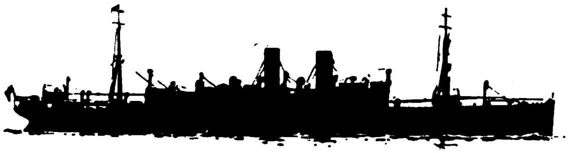
M.S. GRIPSHOLM. Swedish American Line. Length, 550 ft ; Gross Tonnage, 17,716 ;
Funnel : Yellow, Blue Discs on Sides.



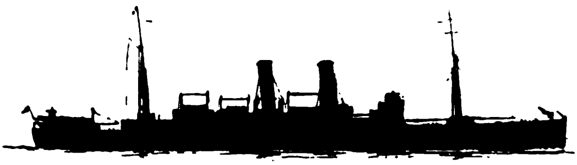
DE GRASSE. Cie. Générale Transatlantique. Length, 552 ft. 1 in. ; Gross Tonnage, 17,752 ;
Funnels : Red, Black Tops.



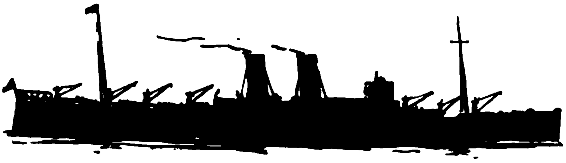
VEENDAM. VOLENDAM. Holland-Amerika Line. Length, 550 ft. 2 ins, ;
Gross Tonnage. 15,450 and 15,434 ;
Funnels : Buff, White Band between Two Green.



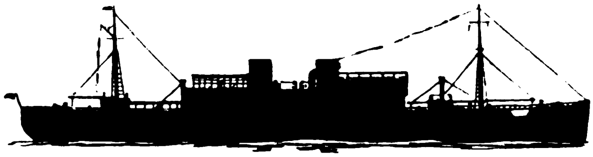
DRESDEN. Norddeutscher Lloyd. Length, 550 ft. ; Gross Tonnage 14,690 ;
Funnels : Yellow.



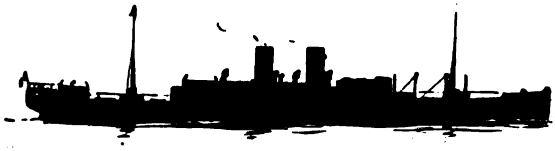
MONTCALM. MONTCLARE. MONTROSE. Canadian Pacific.
Length, 549 ft. 5 ins. ; Gross Tonnage, 16,418 ;
Funnels : Yellow.



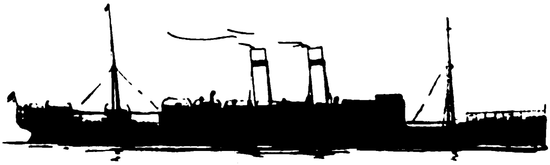
RANCHI. RAWALPINDI. RANPURA. RAJPUTANA. P & O.
Length, 548 ft.; Gross Tonnage, 16,600;
Funnels: Black.



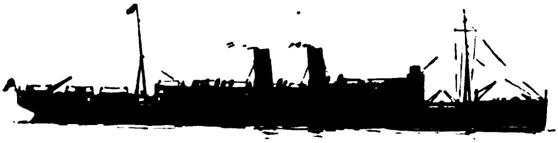
M.S. MILWAUKEE. Hamburg-Amerika. Length, 546 ft. 6 ins.; Gross Tonnage, 16,699;
Funnels: Yellow, with Black, White and Red Bands at Tops.



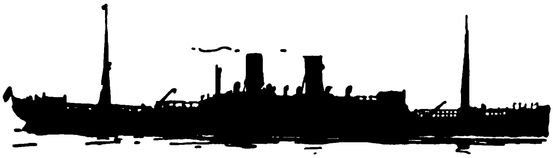
D'ARTAGNAN. Messageries Maritimes. Length, 543 ft. 5 ins.;
Gross Tonnage, 15,105;
Funnels: Black.



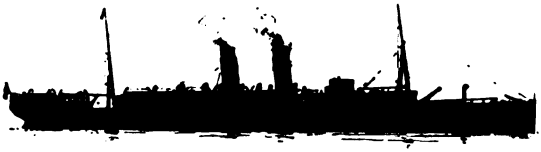
GELRIA. Holland Lloyd. Length, 541 ft : Gross Tonnage, 13,868;
Funnels: Yellow, Black Band.



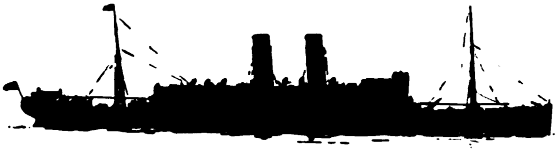
MALWA. MANTUA. P. & O. Length, 540 ft.;
Gross Tonnage, 10,986 and 10,946;
Funnels: Black.



NIEUW ZEELAND. NIEUW HOLLAND. Koninklijke Paketvaart Maatschappij.
Length, 540 ft.; Gross Tonnage, 10,906 and 10,903;
Funnels: Buff, narrow Black Top.

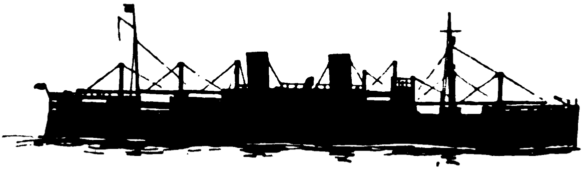


ORSOVA. Orient Line. Length, 536 ft. 2 ins.; Gross Tonnage, 12,041; Funnels: Cream.

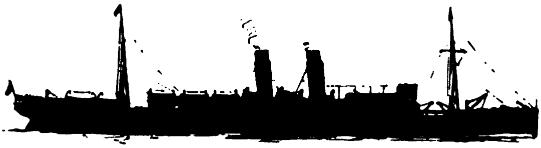


ORVIETO. Orient Line. Length, 535 ft. 8 ins.; Gross Tonnage, 12,133; Funnels: Cream.

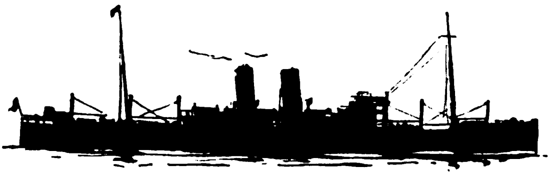
STAVANGERFJORD. Norske Amerika Linie. Length, 532 ft. 5 ins.; Gross Tonnage, 13,156; Funnels: Yellow, Two Red and Two White Bands with Blue Band between.



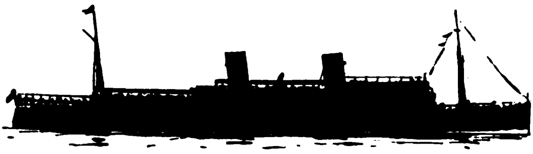
M.S. RANGITIKI. RANGITATA. RANGITANE. New Zealand Shipping Co. Length, 531 ft.; Gross Tonnage, 16,755, 16,737, and 16,733; Funnels: Yellow.



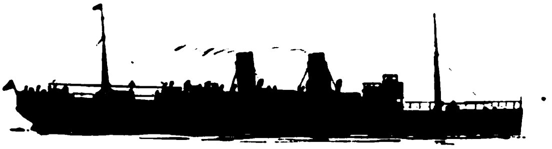
MACEDONIA. P. & O. Line. Length. 530 ft. 4 ins.; Gross Tonnage, 11,120; Funnels: Black.



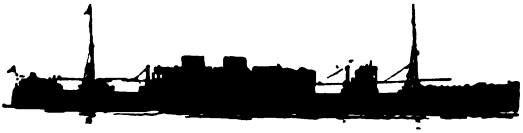
CHITRAL. COMORIN. CATHAY. P. & O. Line.
Length, 526 ft. 3 in., 523 ft. 5 ins. and 523 ft. 5 ins. Gross Tonnage, 15,248, 15,132, and 15,121; Funnels: Black.



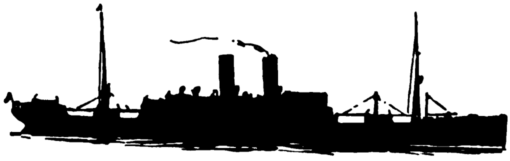
M.S. BERMUDA. Bermuda & West Indies S.S. Co. Length, 525 ft. 9 ins. ;
Gross Tonnage, 19,086 ;
Funnels : Black, Red, Thin Black and Red Bands, Black Tops.



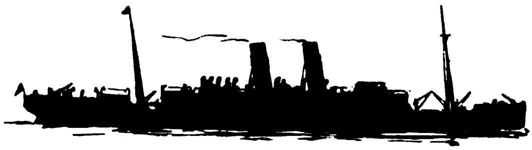
NIAGARA. Union Steam Ship Co. of N.Z. Length, 524 ft. 7 ins. ; Gross Tonnage, 13,415 ;
Funnels : Red, Black Tops.



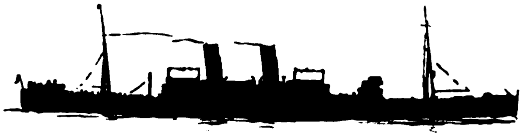
M.S. HIGHLAND BRIGADE. HIGHLAND CHIEFTAIN. HIGHLAND MONARCH.
HIGHLAND PRINCESS. Nelson Line.
Length, 523 ft. 4 ins. ; Gross Tonnage, 14,131 ;
Funnels : Red, Two White Bands, Black between, Black Top.



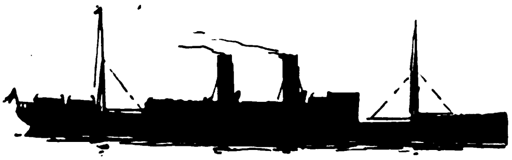
FREDERIK VIII. Det Forenede Damskibs Selskab. Length, 523 ft. ;
Gross Tonnage, 11,850 ;
Funnels : Black, Red Band.



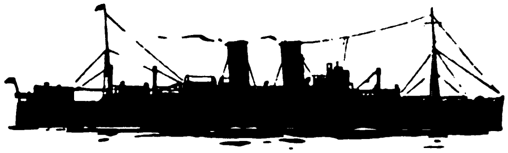
KAISAR-I-HIND. P. & O. Line. Length, 520 ft. ; Gross Tonnage, 11,518 ;
Funnels : Black.



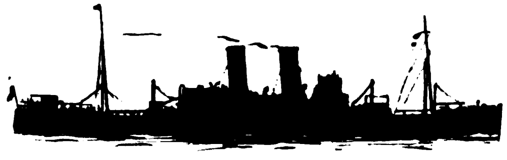
MINNEDOSA. MELITA. Canadian Pacific. Length, 520 ft. ; Gross Tonnage, 15,186,
and 15,183.
Funnels : Yellow.



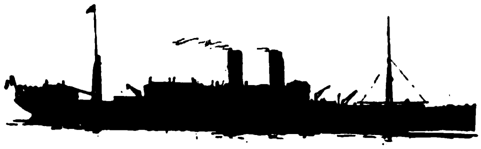
BERGENSFJORD. Norske Amerika Linie. Length, 512 ft. ; Gross Tonnage, 11,013 ;
Funnels : Yellow, Two Red and Two White Bands with Blue Band between.



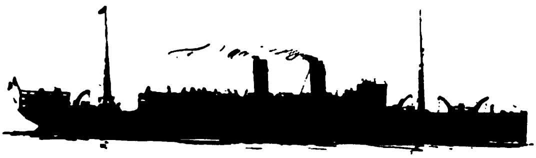
ARANDORA STAR. Blue Star Line. Length, 512 ft. 2 ins. ; Gross Tonnage, 14,694 ;
Funnels : Red, Black Tops, White Band on Black,
Blue Star on White Disc on Red.



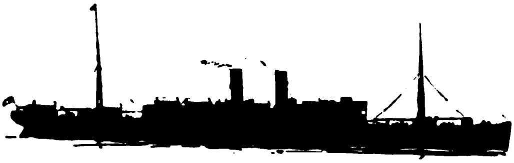
AVILA STAR. AVELONA STAR. ALMEDA STAR. ANDALUCIA STAR. Blue Star Line.
Length, 512 ft. ; Gross Tonnage, 12,872 to 12,842 ;
Funnels : Red, Black Tops, White Band on Black,
Blue Star on White Disc on Red.



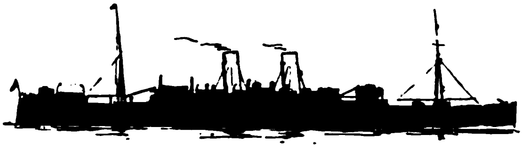
PORTHOS. Messageries Maritimes. Length, 510 ft. 8 ins. ; Gross Tonnage, 12,692 ;
Funnels : Black.



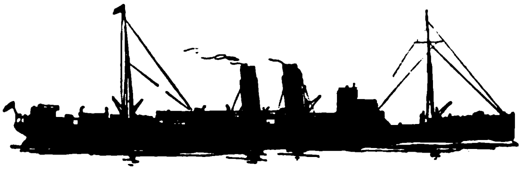
ANDRE LEBON. Messageries Maritimes. Length, 508 ft. 2 ins. ; Gross Tonnage, 13,682 ;
Funnels : Black.



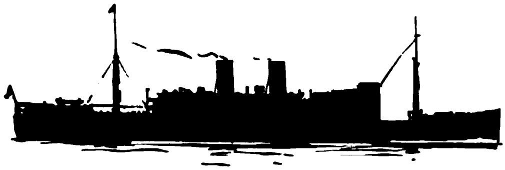
GUADELOUPE. Cie. Gènèrale Transatlantique. Length, 503 ft. Gross Tonnage, 10,502 ;
Funnels : Red, Black Tops.



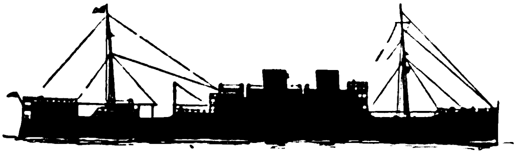
METAGAMA. **Canadian Pacific.** Length, 500 ft. 4 ins.; Gross Tonnage, 12,420; Funnels. Yellow.



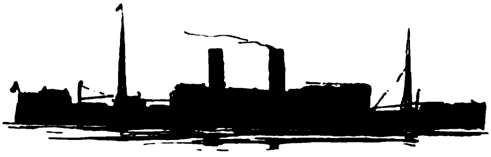
MONOWAI. **Union Steam Ship Co. of New Zealand.** Length, 500 ft. 4 ins.; Gross Tonnage, 10,857: Funnels: Red, Black Tops.



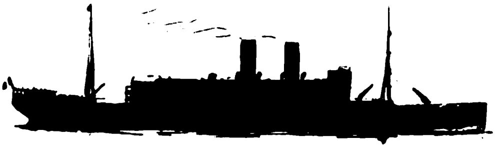
ALBERTVILLE. **Cie. Belge Maritime Du Congo.** Length, 494 ft.; Gross Tonnage, 10,388; Funnels: Yellow.



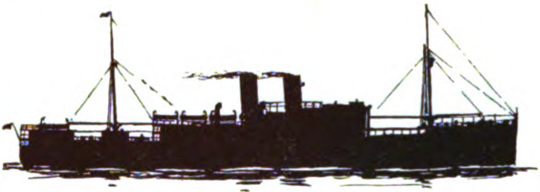
M.S. LLANGIBBY CASTLE. **Union Castle Line.** Length, 486 ft.; Gross Tonnage, 11,951; Funnels: Red, Black Tops.



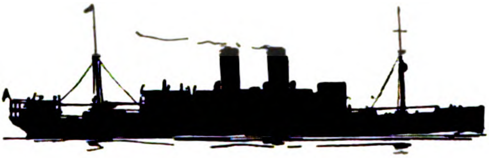
PATRIA. **Rotterdam Lloyd (Wm. Ruys & Zonen).** Length, 480 ft.; Gross Tonnage, 9,891; Funnels: Black.



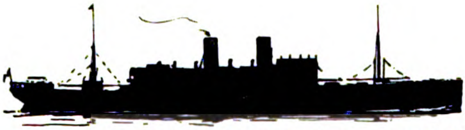
SPHINX. **Messageries Maritimes.** Length, 479 ft.; Gross Tonnage, 11,375; Funnels: Black.



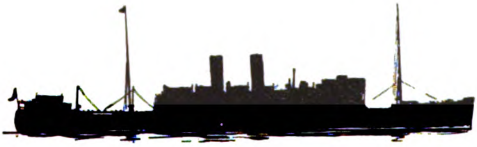
LEOPOLDVILLE. Cie. Belge Maritime de Congo. Length, 478 ft. 4 ins. ; Gross Tonnage, 11,000 ; Funnels : Yellow.



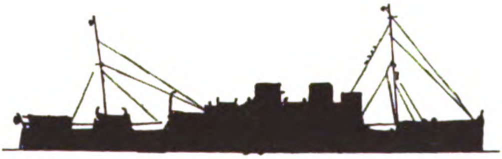
GANGE. Lloyd Triestino. Length, 477 ft. 5 ins. ; Gross Tonnage, 12,272 ; Funnels : Black.



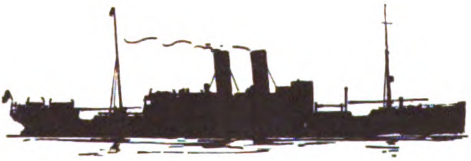
CUBA. Cie. Générale Transatlantique. Length, 476 ft. ; Gross Tonnage, 11,337 ; Funnels : Red, Black Tops.



FLORIDA. Société Générale de Transports Maritimes à Vapeur. Length, 471 ft. 2½ ins. ; Gross Tonnage, 9,149 ; Funnels : Black.

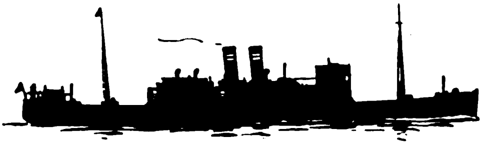


M.S. DUNBAR CASTLE. Union Castle Line. Length, 470 ft. ; Gross Tonnage, 10,000 ; Funnels : Red, Black Tops.

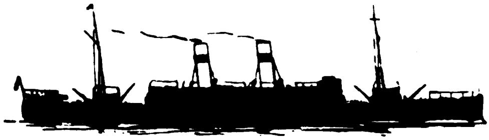


MARTHA WASHINGTON. Cosulich Line. Length, 459 ft. ; Gross Tonnage, 8,347 ; Funnels : Red, White Band, Black Tops.

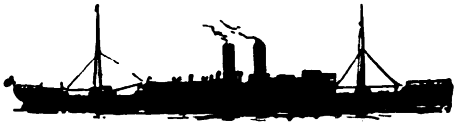
M.S. MAGDALENA. ORINOCO. Hamburg-Amerika. Length, 456 ft. 8 ins.; Gross Tonnage, 9,540; Funnels: Yellow, with Black, White, and Red Band at Tops.



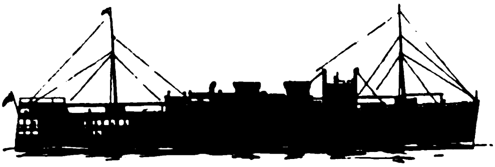
TALMA. TILAWA. British India S.N. Co. Length, 450 ft.; Gross Tonnage, 10,000; Funnels: Black, Two White Bands, Black Tops.



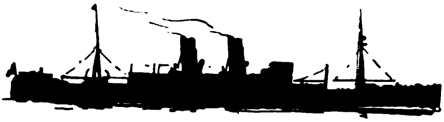
FLANDRIA. ORANIA. Holland Lloyd. Length, 450 ft.; Gross Tonnage, 10,171 and 9,763; Funnels: Yellow, Black Band.



PEROU. Cie. Générale Transatlantique. Length, 449 ft.; Gross Tonnage, 6,600; Funnels: Red, Black Tops.

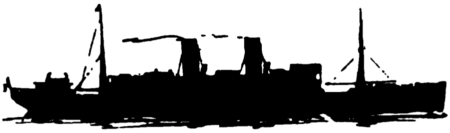


M.S. ERIDAN. Messageries Maritimes. Length, 442 ft. 8 ins.; Gross Tonnage, 9,927; Funnels: Black.

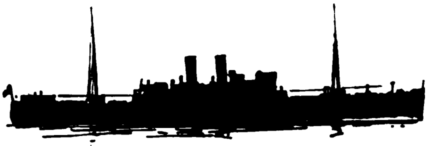


DE LA SALLE. Cie. Générale Transatlantique. Length, 440 ft.; Gross Tonnage, 8,400; Funnels: Red, Black Tops.

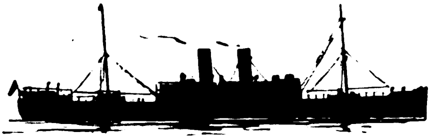
SINAIA. Cyp. Fabre. Length, 440 ft.; Gross Tonnage, 8,666.



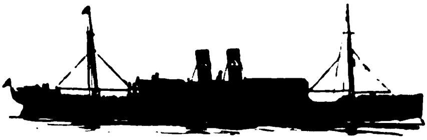
ASIE. Chargeurs Reunis. Length, 439 ft. ; Gross Tonnage, 9,059 ;
Funnels : Yellow, Red Stars on White Band.



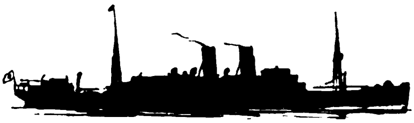
M.S. THÉOPHILE GAUTIER. Messageries Maritimes. Length, 425 ft. ;
Gross Tonnage, 9,000 ;
Funnels : Black.



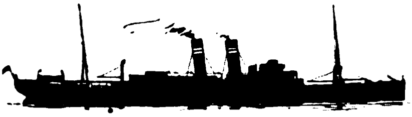
SIMON BOLIVAR. Royal Nederlands West Indian Mail Line.
Length, 420 ft. ; Gross Tonnage, 7,906 ;
Funnels : Black, Two White Bands.



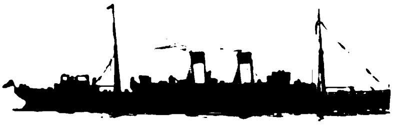
M.S. RIO BRAVO. M.S. RIO PANUCO. Flensburger Dampfer Co. (H. Schuldt).
Length, 410 ft. ; Gross Tonnage, 6,000 ;
Funnels : Black, Blue Band, White Diamond with Red S.



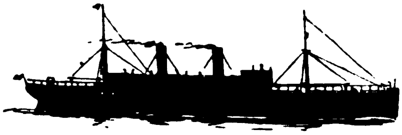
NAGASAKI MARU. SHANGHAI MARU. Nippon Yusen Kaisha. Length, 402 ft. ;
Gross Tonnage, 5,272 ;
Funnels : Black.



ARANKOLA. British India S.N. Co. Length, 390 ft. 3 ins. ; Gross Tonnage, 4,129 ;
Funnels : Black, Two White Bands, Black Tops.

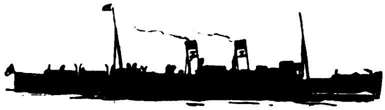


ANGLIA. CAMBRIA. HIBERNIA. SCOTIA. L. M.S. Railway.
Length, 380 ft. 5 ins. ; Gross Tonnage, 3,460 ;
Funnels : Yellow, Black Tops.

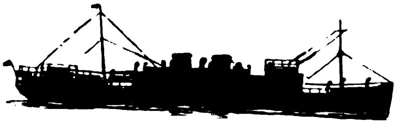


PRESIDENT DAL PIAZ. Cie. Générale Transatlantique Length, 377 ft.;
Gross Tonnage, 5.000;
Funnels: Red, Black Tops.

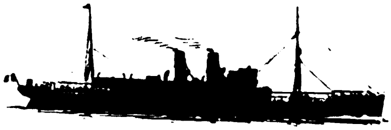
WAHINE. Union Steam Ship Co. of N.Z. Length, 375 ft.; Gross Tonnage, 4,436;
Funnels: Red, Black Tops.



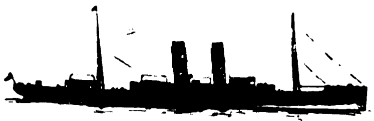
KEIFUKU MARU. SHOKEI MARU. TOKUJU MARU. Imperial Japanese Railway.
Length, 375 ft.; Gross Tonnage, 5,857:
Funnels: Yellow, Black Top, Red I on Yellow.



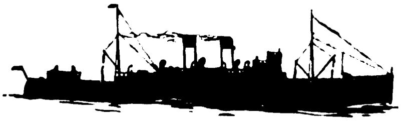
M.S. INFANTA CRISTINA. Compania Transmediterranea. Length, 362 ft.;
Gross Tonnage, 4,900.
Funnels: Black, White Band.



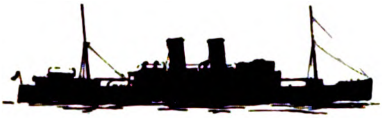
GOUVERNEUR GENERAL CHANZY. GOUVERNEUR GENERAL GREVY. DE GUEYDON. JONNART. French Government. Length, 361 ft.; Gross Tonnage, 4,500.



ST. ANDREW. ST. DAVID. Great Western Railway.
Length, 351 ft. 1 in.; Gross Tonnage, 2,495;
Funnels: Red, Black Tops.

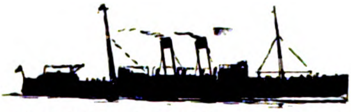


VIENNA. AMSTERDAM. PRAGUE. London and North Eastern Railway.
Length, 350 ft.; Gross Tonnage, 4,218;
Funnels: Yellow, Black Tops.

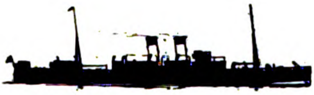


DUKE OF ARGYLL. DUKE OF LANCASTER. DUKE OF ROTHESAY. London, Midland and Scottish Railway. Length, 349 ft.; Gross Tonnage, 3,608; Funnels: Yellow, Black Tops.

M.S. ULSTER MONARCH. ULSTER QUEEN. ULSTER PRINCE. Ulster Imperial Line. Length, 346 ft.; Gross Tonnage, 3,759; Funnels: Red, Black Top.



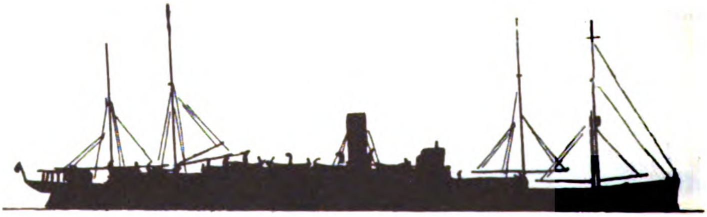
ANTWERP. MALINES. BRUGES. London and North Eastern Railway. Length, 321 ft. 6 ins.; Gross Tonnage, 2,957; Funnels: Yellow, Black Tops.



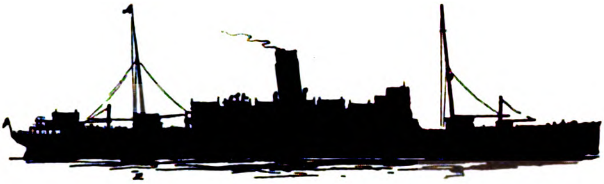
CURRAGHMORE. London, Midland and Scottish Railway. Length, 307 ft. 1 in.; Gross Tonnage, 1,587; Funnels: Yellow, Black Tops.

HANTONIA. NORMANNIA. Southern Railway. Length, 290 ft. 3 ins; Gross Tonnage, 1,567; Funnels: Buff.

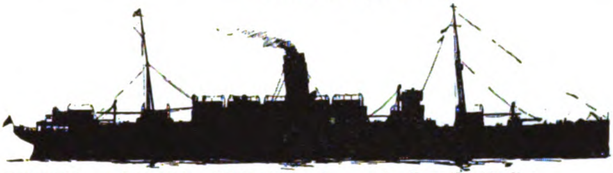
DIEPPE. Southern Railway. Length, 273 ft. 5 ins.; Gross Tonnage, 1,228; Funnels: White. Black Tops.



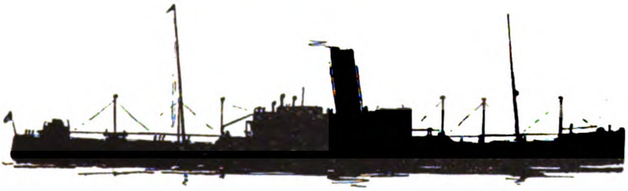
CERAMIC. White Star Line. Length, 655 ft. 1 in.; Gross Tonnage, 18,495; Funnel: Buff, Black Top.



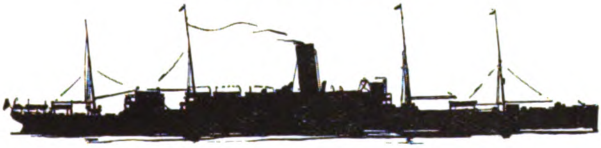
CARINTHIA. FRANCONIA. Cunard. Length, 601 ft.; Gross Tonnage, 20,277 and 20,175; Funnel: Red, Black Top.



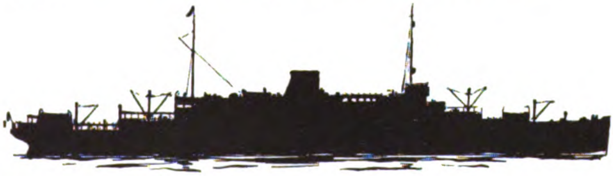
SCYTHIA. LACONIA. SAMARIA. Cunard. Length, 601 ft.;
Gross Tonnage, 19,761, 19,695, and 19,597;
Funnels: Red, Black Top.



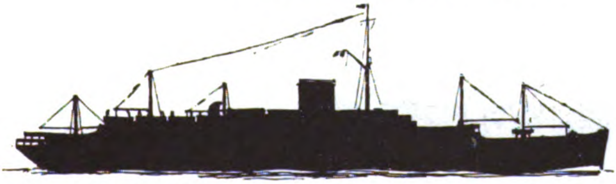
MINNETONKA. MINNEWASKA. Atlantic Transport. Length, 600 ft. 8 ins.;
Gross Tonnage, 21,998 and 21,716;
Funnel: Red, Black Top.



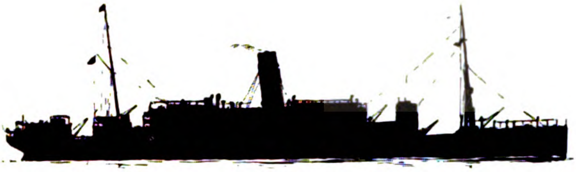
NIEUW AMSTERDAM. Holland-Amerika. Length, 600 ft. 3 ins.; Gross Tonnage, 17,149;
Funnel: Buff, White Band between Two Green.



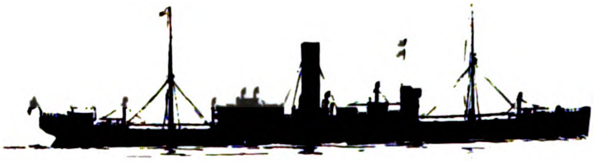
M.S. VULCANIA. M.S. SATURNIA. Cosulich Line. Length, 599 ft. and 606 ft. 2 ins.;
Gross Tonnage, 23,970 and 23,940;
Funnel: Red, White Band and Black Top.



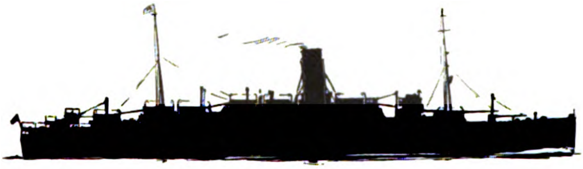
M.S. LAFAYETTE. Cie Générale Transatlantique. Length, 574 ft. 1 in.
Gross Tonnage, 25,082;
Funnel: Red, Black top.



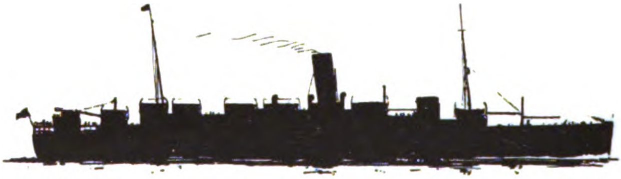
ALMANZORA. ARLANZA. ATLANTIS. Royal Mail Steam Packet Co.
Length, 570 ft. ; Gross Tonnage, 15,551 to 14,622 ;
Funnel : Buff.



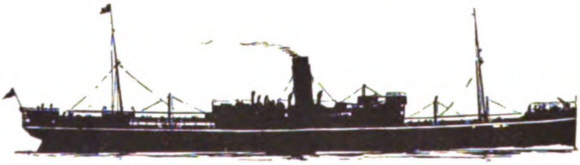
ULYSSES. NESTOR. Blue Funnel Line. Length, 563 ft. 2 ins. ;
Gross Tonnage, 14,652 and 14,629 ;
Funnel : Blue, Black Top.



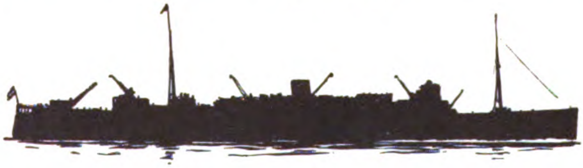
TUSCANIA. CALIFORNIA. Anchor. Length, 553 ft. ; Gross Tonnage, 16,991 and 16,792 ;
Funnel : Black.



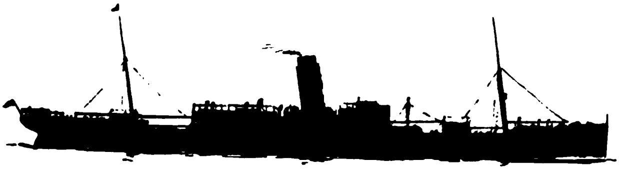
LANCASTRIA. Cunard. Length, 552 ft. 8 ins. Gross Tonnage, 16,243 ;
Funnel : Red, Black Top.
CAMERONIA. Anchor. Length, 552 ft. 4 ins. ; Gross Tonnage, 16,297 ;
Funnel : Black.



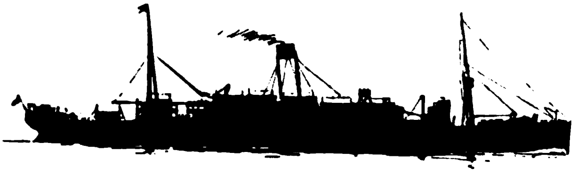
MOLDAVIA. MONGOLIA. P. & O. Line. Length, 552 ft. ; Gross Tonnage, 16,543 and 16,504 ;
Funnel : Black.



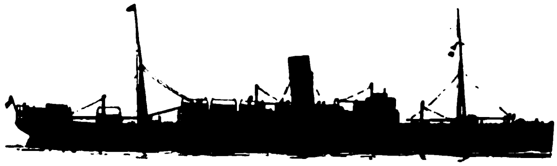
M.S. CHRISTIAAN HUYGENS. Stoomvaart Maatschappij Nederland.
Length, 551 ft. 5 ins. ; Gross Tonnage, 15,637 ;
Funnels : Buff, Black Top.



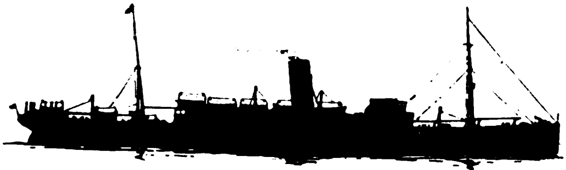
EURIPIDES. Aberdeen-White Star Line. Length, 550 ft. 7 ins.; Gross Tonnage, 14,947; Funnel: Buff.



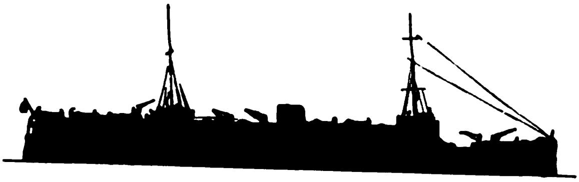
MEGANTIC. White Star. Length, 550 ft. 4 ins.; Gross Tonnage, 14,878; Funnel: Buff, Black Top.



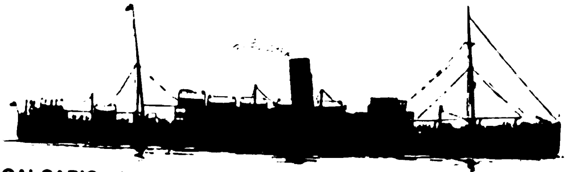
ORDUNA. Pacific Steam Navigation Co. Length, 550 ft. 3 ins.; Gross Tonnage, 15,507; Funnel: Buff.



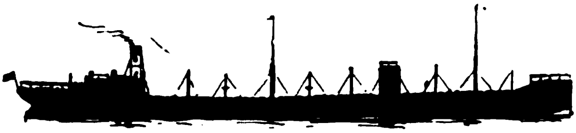
ORBITA. Pacific Steam Navigation Co. Length, 550 ft. 3 ins.; Gross Tonnage, 15,495; Funnel: Buff.



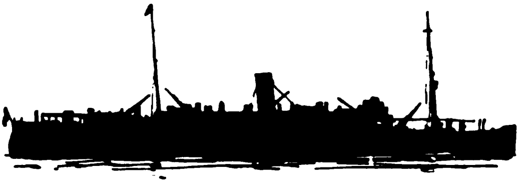
M.S. BALOERAN. Rotterdam Lloyd. Length, 550 ft.; Gross Tonnage, 16,981; Funnel: Black.



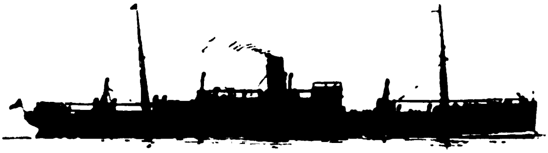
CALGARIC. White Star. Length, 550 ft.; Gross Tonnage, 16,063; Funnel: Buff, Black Top.



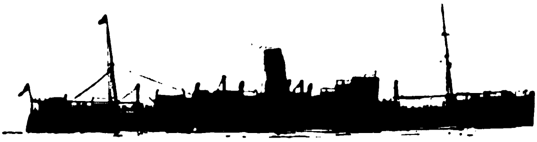
BETHORE. Ore Steamship Co., N.Y. Length, 550 ft.; Gross Tonnage 8,257; Funnel: Grey, Blue and White Bands, White O.



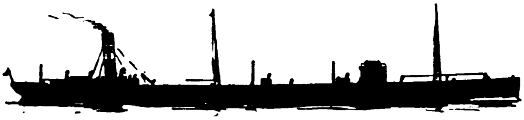
M.S. PIETER CORNELISZOON HOOFT. Stoomvaart Maatschappij Nederland Length, 541 ft. 8 ins.; Gross Tonnage, 14,642; Funnel: Buff, Black Top.



ESPERANCE BAY. MORETON BAY. LARGS BAY. HOBSONS BAY. JERVIS BAY. Aberdeen-Commonwealth Line. Length, 530 ft.; Gross Tonnage, 18,856 to 18,889; Funnel: Yellow.

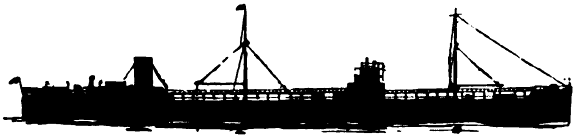


OROPESA. Pacific Steam Navigation Co. Length, 530 ft.; Gross Tonnage, 14,072; Funnel: Buff.

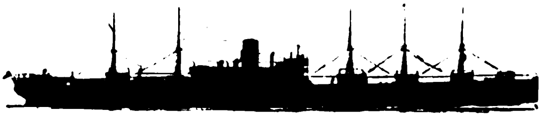


SAN MELITO. Eagle Oil Transport Co. Length, 530 ft.; Gross Tonnage, 12,286; Funnel: Black, Yellow Band, Black Eagle, Black O on White Band, Yellow Band.

CADILLAC. SARANAC. Anglo American Oil Co. Length, 530 ft. 2 ins.; Gross Tonnage, 12,074; Funnel: Red, Black Top.

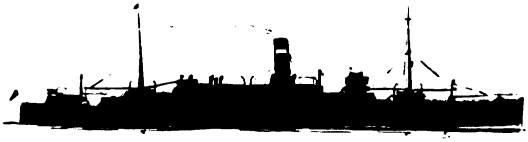


M.S. ATHELCROWN. United Molasses Co. Length, 526 ft. 5 ins.; Gross Tonnage, 11,905;
Funnel: Red, B.M.Co. on White Diamond, Black Top.

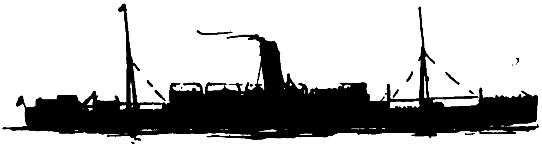


ROTORUA. New Zealand Shipping Co. Length, 526 ft. 4 ins.; Gross Tonnage, 12,112;
Funnel: Buff.

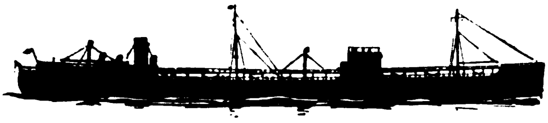
ARGYLLSHIRE. Scottish Shire Line. Length, 526 ft. 2 ins.; Gross Tonnage, 11,916;
Funnel: Buff.



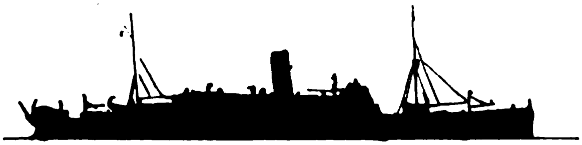
LETITIA. ATHENIA. Anchor-Donaldson. Length, 526 ft.;
Gross Tonnage, 13 475 and 13,465;
Funnel: Black, White Band, Black Top.



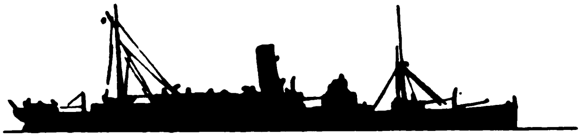
OROYA. Pacific Steam Navigation Co. Length, 525 ft. 3 ins.; Gross Tonnage, 12,257;
Funnel: Buff.



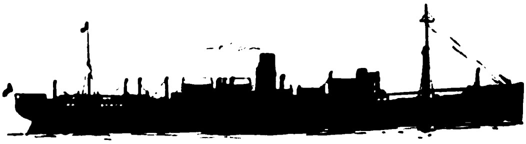
CALGAROLITE. Imperial Oil Co. Length, 522 ft.; Gross Tonnage, 11,941;
Funnel: Black, Blue Band between Two White, Black Top.



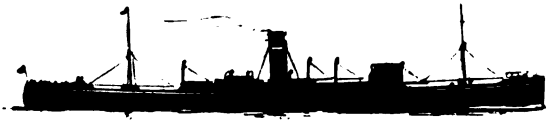
ALAUNIA ASCANIA. AURANIA. Cunard Line. Length, 520 ft.;
Gross Tonnage, 14,030 to 13,984;
Funnels: Red, Black Tops.



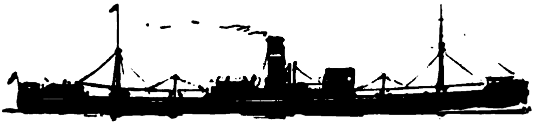
ANDANIA. AUSONIA. ANTONIA. Cunard Line. Length, 520 ft.,
Gross Tonnage, 13,950 to 13,867;
Funnels: Red, Black Tops.



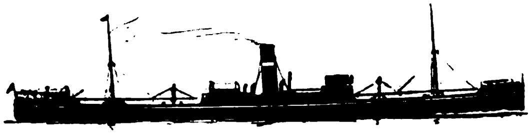
BARRABOOL. BARADINE. BALLARAT. BENDIGO. BALRANALD. P. & O.
Length, 519 ft. 9 ins.; Gross Tonnage, 13,164 to 13,058:
Funnel: Black.



MANGALORE. MATHURA. Brocklebank. Length, 518 ft.; Gross Tonnage, 9,571 and 9,743;
Funnel: Black, Blue and White Band, Black Top.



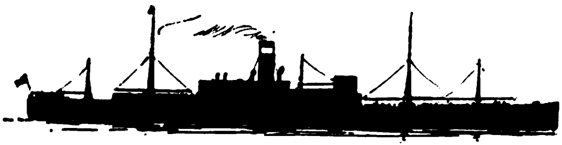
MALANCHA. Brocklebank. Length, 518 ft.; Gross Tonnage, 9,917;
Funnel: Black, Blue and White Band, Black Top.



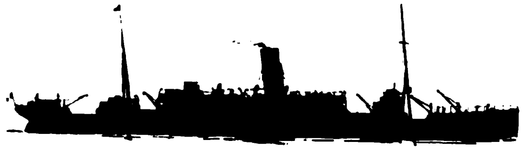
A HARDA. Brocklebank. Length, 518 ft.; Gross Tonnage, 9,875;
Funnel: Black, Blue and White Band, Black Top.

DROTTNINGHOLM. Swedish American Line. Length, 517 ft.; Gross Tonnage, 11,165;
Funnel: Yellow Blue Disc, Three Gold Crowns.

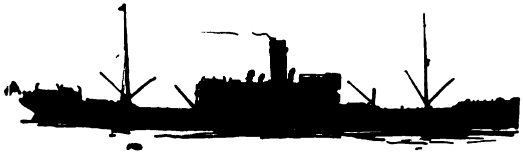
TAMAROA MATAROA. Shaw, Savill and Albion. Length, 500 ft. 4 ins.;
Gross Tonnage, 12,354 and 12,333;
Funnel: Buff, Black Top.



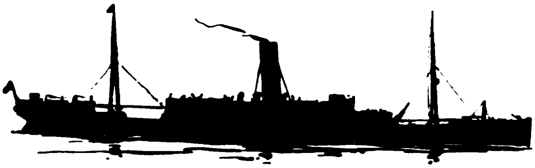
PRESIDENT ROOSEVELT. United States Lines. Length, 516 ft. 5 ins.; Gross Tonnage, 13,869; Funnel: Red, White Band, Blue Top.



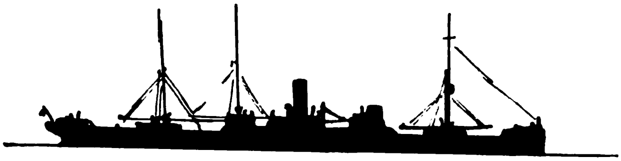
KRALJICA MARIJA. Jugoslavenski Lloyd. Length, 515 ft. 2 ins.; Gross Tonnage, 10,196.



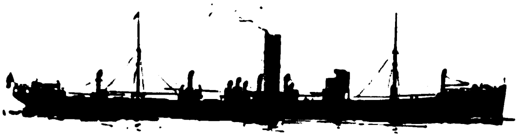
FUSHIMI MARU. SUWA MARU. Nippon Yusen Kaisha. Length, 513 ft. and 516 ft.; Gross Tonnage, 10,936 and 10,672; Funnel: Black.



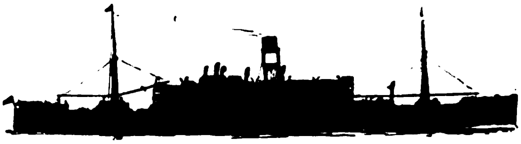
ORCOMA. Pacific Steam Navigation Co. Length, 511 ft. 6 ins. Gross Tonnage, 11,580; Funnel: Buff.



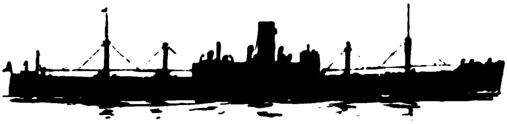
HORORATA. New Zealand Shipping Co. Length, 511 ft. 1 in.; Gross Tonnage, 11,243; Funnel: Buff.



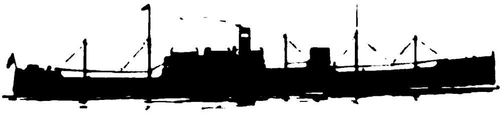
PHILOCTETES. ACHILLES. TYNDAREUS. Blue Funnel Line. Length, 511 ft. 9 ins., 507 ft. 4 ins., and 507 ft.; Gross Tonnage, 11,446 to 11,347; Funnel: Blue, Black Top.



VOLTAIRE. VANDYCK. Lamport and Holt. Length, 510 ft.;
Gross Tonnage, 13,248 and 13,233:
Funnel: Blue, White Band. Black Top.

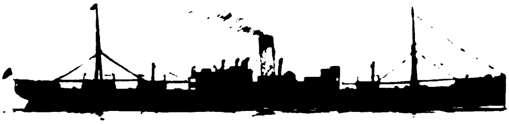


BEAVERFORD. BEAVERHILL. BEAVERBRAE. BEAVERBURN. BEAVERDALE.
Canadian Pacific. Length, 503 ft.; Gross Tonnage, 10,042;
Funnel: Yellow.



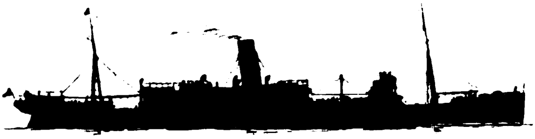
PRESIDENT ADAMS.	**Dollar Steamship**	**Line.**	Length, 502 ft.;	Gross	Tonnage,	10,558;
PRESIDENT GARFIELD.	,, ,,	,,		,,	,,	10,558;
PRESIDENT HARRISON.	,, ,,	,,		,,	,,	10,533;
PRESIDENT HAYES.	,, ,,	,,		,,	,,	10,533;
PRESIDENT MONROE.	,, ,,	,,		,,	,,	10,533;
PRESIDENT VANBUREN.	,, ,,	,,		,,	,,	10,533;
PRESIDENT POLK.	,, ,,	,,		,,	,,	10,500;

Funnel: Black, White $ on Red Band.

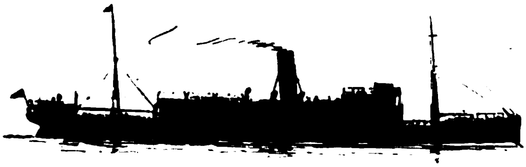


PORT MELBOURNE. PORT NAPIER. PORT SYDNEY. Commonwealth and Dominion Line. Length, 501 ft. 3 ins.; Gross Tonnage, 9,152;
Funnel: Red, Black Top.

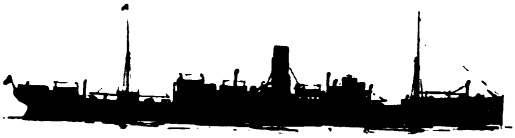
DARRO. DEMERARA. DESNA. DESEADO. Royal Mail Steam Packet Co.
Length, 500 ft. 7 ins.; Gross Tonnage, 11,484 to 11,477;
Funnel: Buff.



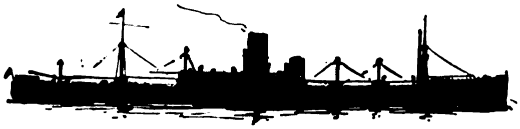
THEMISTOCLES. DEMOSTHENES. Aberdeen-White Star Line. Length, 500 ft. 6 ins.;
Gross Tonnage, 11,231 and 11,223;
Funnel: Buff.



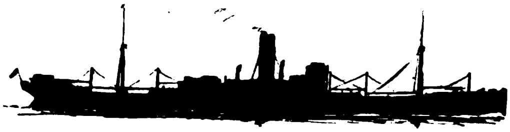
LLANSTEPHAN CASTLE. **Union Castle Line.** Length, 500 ft. 5 ins.; Gross Tonnage, 11,293; Funnel: Red, Black Top.



BENALLA. **P. & O. Line.** Length, 500 ft. Gross Tonnage, 11,181; Funnel: Black.

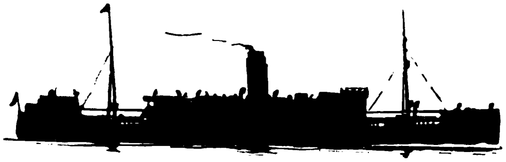


FERNDALE. **FORDSDALE.** **Aberdeen Commonwealth Line.** Length, 500 ft.; Gross Tonnage, 9,674; Funnel: Yellow

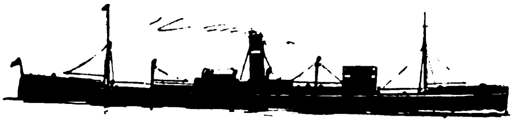


GLENIFFER. **Glen Line.** Length, 500 ft.; Gross Tonnage, 9,429; Funnel: Red, Black Top.

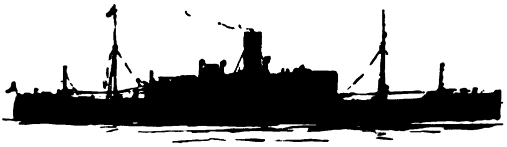
CARNARVONSHIRE. **Royal Mail Steam Packet Co.** Funnel: Buff.



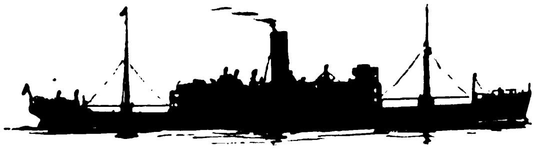
CRISTOBAL COLON. **ALFONSO XIII.** **Compañia Trasatlantica.** Length, 499 ft. 4 ins. and 480 ft.; Gross Tonnage, 10,833 and 10,551; Funnel: Black.



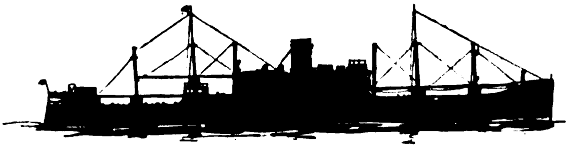
MAGDAPUR. **MANIPUR.** **Brocklebank Line.** Length, 499 ft. 6 ins.; Gross Tonnage, 9,237; Funnel: Black, Blue and White Band, Black Top.



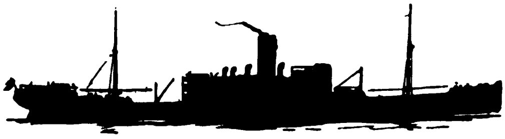
ANTONIO DELFINO. **Hamburg-South Amerika.** Length, 499 ft. 5 ins.;
Gross Tonnage, 13,589;
Funnel: White, Red Top.



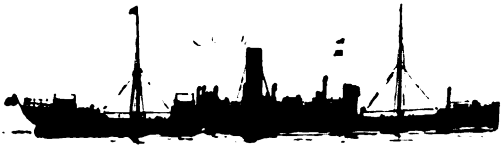
SARPEDON. HECTOR. ANTENOR **Blue Funnel Line.**
Length, 499 ft., 498 ft. 8 ins., 497 ft. 7 ins.; Gross Tonnage, 11,321 to 11,174;
Funnel: Blue, Black Top.



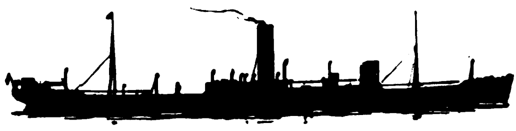
NORTHERN PRINCE. EASTERN PRINCE. SOUTHERN PRINCE. WESTERN PRINCE.
Prince Line. Length, 496 ft. 2 ins.; Gross Tonnage, 10,926 to 10,917;
Funnel: Black, Two Red Bands, Feathers on side.



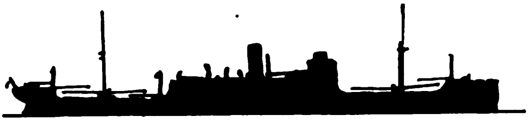
HAKONE MARU. HAKOZAKI MARU. HARUNA MARU. **Nippon Yusen Kaisha.**
Length, 495 ft.; Gross Tonnage, 10,420;
Funnel: Black.



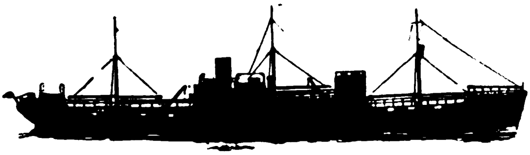
AENEAS. ASCANIUS. ANCHISES. **Blue Funnel Line.** Length, 493 ft.;
Gross Tonnage, 10,068 to 10,000;
Funnel: Blue, Black Top.



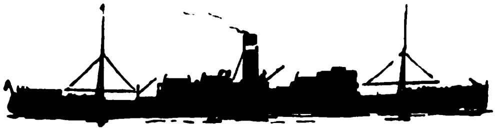
DIOMED. CALCHAS. MENELAUS. PERSEUS. **Blue Funnel Line.**
Length, 491 ft., 490 ft 8 ins., 495 ft. 5 ins., and 490 ft. 5 ins.;
Gross Tonnage, 10,354 to 10,276;
Funnel: Blue, Black Top.



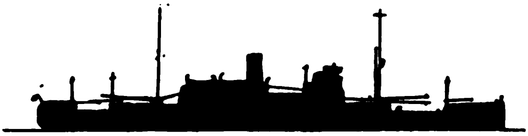
M.S. DELFTDIJK. M.S. DAMSTERDIJK. Holland-America. Length, 490 ft. 9 ins.; Gross Tonnage, 10,220 and 10,155; Funnel: Buff, White Band between Two Green.



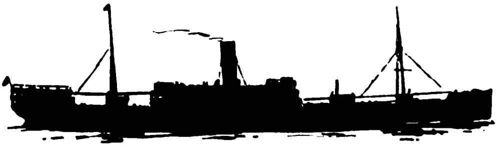
POELAU BRAS. POELAU LAUT. POELAU ROEBIAH. POELAU TELLO. Stoomvaart Maatschappij Nederland. Length, 490 ft.; Gross Tonnage, 9,250; Funnels: Buff, Black Top.



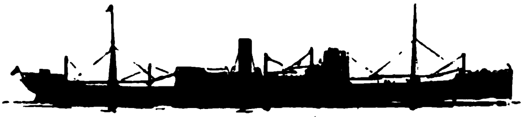
CITY OF EXETER. Ellerman City Line. Length, 486 ft. 7 ins.; Gross Tonnage, 9,447; Funnel: Buff, White Band, Black Top.



SULTAN STAR. M.S. TUSCAN STAR. Blue Star Line. Length, 486 ft. 1 in. and 471 ft.; Gross Tonnage, 12,326; Funnel: Red. Black Top, White Band on Black, Blue Star on White Disc on Red.



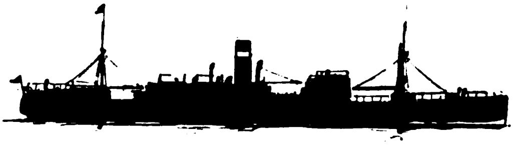
REMUERA. New Zealand Shipping Co. Length, 485 ft.; Gross Tonnage, 11,883; Funnel: Yellow.



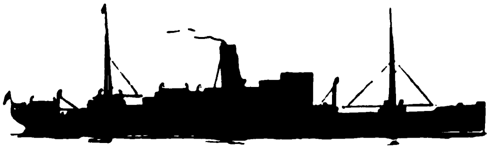
M.S. GLENAPP. M.S. GLENBEG. M.S. GLENGARRY. M.S. GLENOGLE. Glen Line. Length, 485 ft.; Gross Tonnage, 9,460; Funnel: Red, Black Top.

M.S. DINTELDIJK. M.S. DRECHTDIJK. Holland Amerika. Length, 485 ft.; Gross Tonnage, 9,399; Funnel: Buff, Two Green Bands, White between, Buff Top.

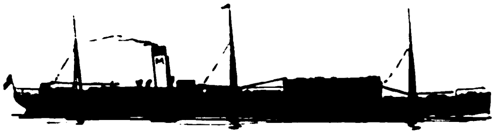
M.S. LOCHKATRINE. M.S. LOCHMONAR. M.S. LOCHGOIL. Royal Mail Steam Packet Co. Length, 485 ft.; Gross Tonnage, 9,409 Funnel: Buff.



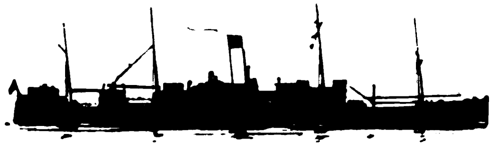
CITY OF PARIS. **Ellerman City Line.** Length, 484 ft. 7 ins.; Gross Tonnage, 10,902,
Funnel: Buff, White Band, Black Top.



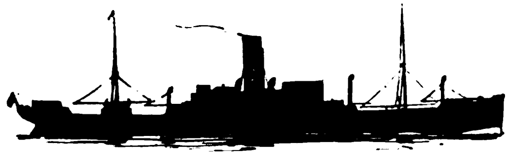
KERGUELEN. **Chargeurs Réunis.** Length, 484 ft. 2 ins.; Gross Tonnage, 10,123;
Funnel: Yellow, Red Stars on White Band.



MAUI. **Matson Navigation Co.** Length 484 ft.; Gross Tonnage, 9,801;
Funnel: Yellow, Black Top, with "M."

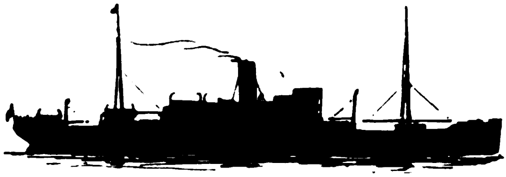


M.S. STAFFORDSHIRE. SHROPSHIRE. **Bibby Line.** Length, 483 ft. 6 ins.;
Gross Tonnage, 10,654 and 10,560;
Funnel: Salmon Pink, Black Top.



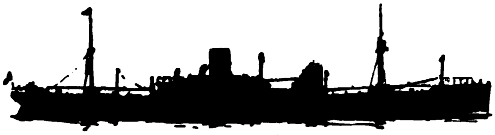
CEYLAN. MALTE. **Chargeurs Réunis.** Length, 483 ft., Gross Tonnage, 9,000;
Funnel: Yellow, Red Stars on White Band.

NIAGARA. **Cie. Générale Transatlantique.**
Funnel: Red, Black Top.

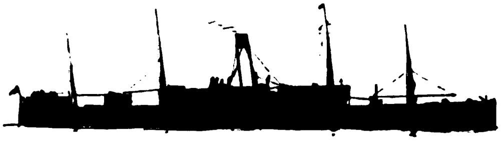


FORMOSE
GROIX } **Chargeurs Réunis.** Length, 483 ft. 4 ins.; Gross Tonnage, 9,975;
HOEDIC.
BELLE ISLE. ,, ,, ,, 479 ft.; ,, ,, 9,591;
AURIGNY. ,, ,, ,, 481 ft. 6 ins.; ,, ,, 9,589;
DESIRADE
EUBEE. } ,, ,, ,, 483 ft. 4 ins.; ,, ,, 9,645;
Funnel: Yellow, Red Stars on White Band.

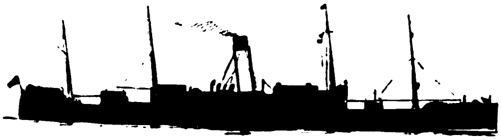
COMPIÈGNE. CHANTILLY. **Messageries Maritimes.**
Funnel: Black.



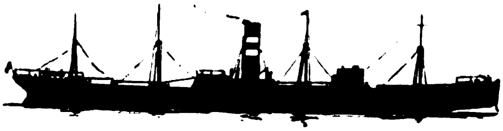
M.S. ZEALANDIC. M.S. COPTIC. Shaw Savill and Albion Co. Length, 482 ft. 6 ins.; Gross Tonnage, 8,281; Funnel: Buff, Black Top.



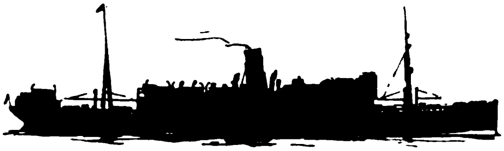
YORKSHIRE. Bibby Line. Length, 482 ft. 4 ins.; Gross Tonnage, 10,184; Funnel: Salmon Pink, Black Top.



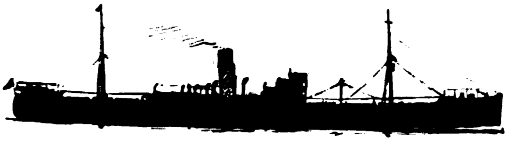
LANCASHIRE. Bibby Line. Length, 482 ft. 4 ins.; Gross Tonnage, 9,445; Funnel: Salmon Pink, Black Top.



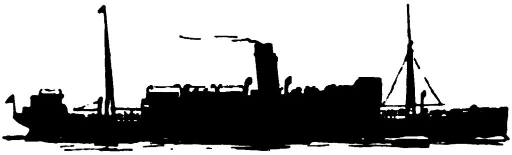
DIPLOMAT. Harrison Line. Length, 482 ft.; Gross Tonnage, 8,218; Funnel: Black, Red Band between Two White.



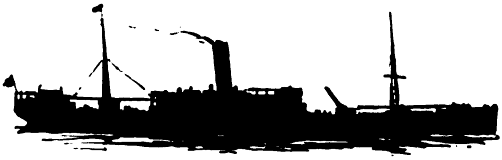
INFANTA ISABEL DE BORBON. Compañia Trasatlantica. Length, 481 ft. 9 ins.; Gross Tonnage, 10,348; Funnel: Black.



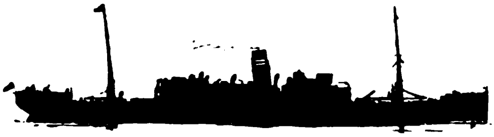
PORT ADELAIDE. PORT AUCKLAND. PORT BOWEN. PORT CAMPBELL. PORT CAROLINE. PORT BRISBANE. PORT HARDY. PORT HUNTER. PORT NICHOLSON. Commonwealth and Dominion Line. Length, 481 ft. 2 ins.; Gross Tonnage, 8,422; Funnel: Red, Black Top.



REINA VICTORIA EUGENIA. Compañia Trasatlantica. Length, 480 ft.; Gross Tonnage, 10,137; Funnel: Black.

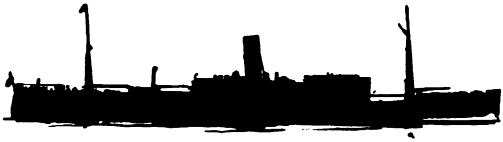


RUAHINE. New Zealand Shipping Co. Length, 480 ft. 6 ins.; Gross Tonnage, 10,870; Funnel: Yellow.

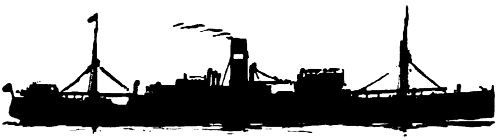


NEURALIA. NEVASA. British India S.N. Co. Length, 480 ft. 5 ins.; Gross Tonnage, 9,082; Funnel: Black, Two White Bands, Black Top.

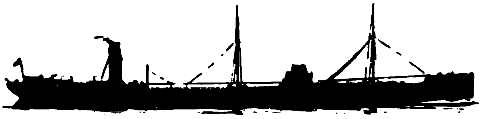
KASHGAR. KASHMIR. KALYAN. KARMALA. KHIVA. KHYBER. P. & O. Length, 479 ft. 9 ins.; Gross Tonnage, 9,000; Funnel: Black.



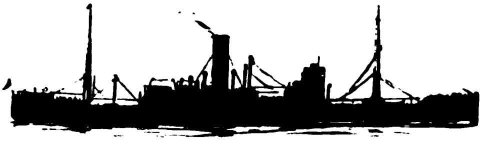
M.S. INDRAPOERA. Rotterdam Lloyd. Length, 479 ft. 5 ins.; Gross Tonnage, 10,678; Funnel: Black.



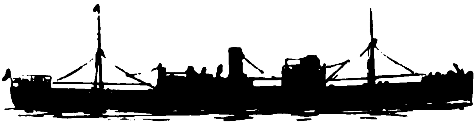
CITY OF SIMLA. Ellerman City Line. Length, 476 ft. 7 ins.; Gross Tonnage, 9,468; Funnel: Buff, White Band, Black Top.



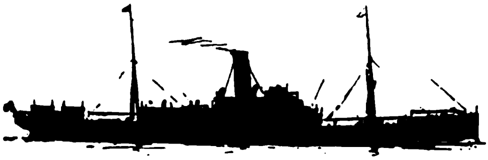
IROQUOIS. Anglo-American Oil Co. Length, 476 ft. 8 ins.; Gross Tonnage, 9,202; Funnel: Red, Black Top.



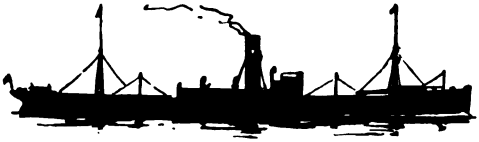
RODNEY STAR. STUART STAR. AFRIC STAR. NAPIER STAR. Blue Star Line. Length, 476 ft.; Gross Tonnage, 10,853 to 10,583; Funnel: Red, Black Tops, White Band on Black, Blue Star on White Disc on Red.



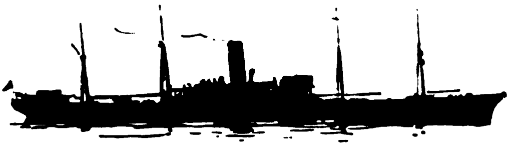
M.S. PORT ALMA. M.S. PORT FAIRY. M.S. PORT HUON. M.S. PORT FREMANTLE. M.S. PORT GISBORNE. Commonwealth and Dominion. Length, 475 ft. 6 ins.; Gross Tonnage, 8,000; Funnel: Red, Black Top.



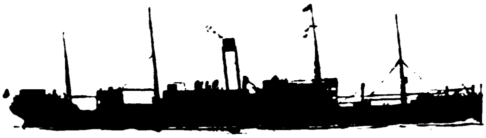
DUNLUCE CASTLE. DURHAM CASTLE. Union Castle. Length, 475 ft. 5 ins.; Gross Tonnage, 8,130; Funnel: Red, Black Top.



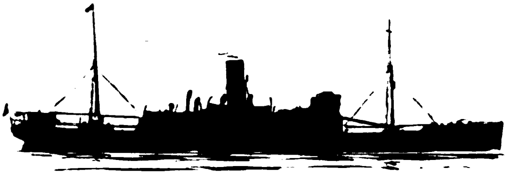
ARIZONA MARU. ALABAMA MARU. AFRICA MARU. MANILA MARU. HAWAI MARU. Osaka Shosen Kaisha. Length, 475 ft. Gross Tonnage, 9,500; Funnel: Black, Two White Bands, joined at Side.



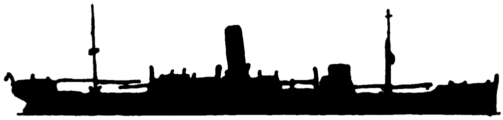
DOMINIA. Telegraph Construction and Maintenance Co. Length, 475 ft.; Gross Tonnage, 9,250; Funnel: Yellow.



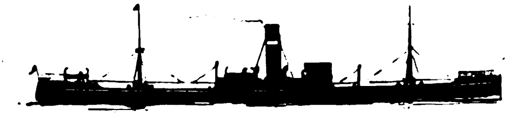
OXFORDSHIRE. **Bibby Line.** Length, 474 ft. 7 ins. , Gross Tonnage, 8,624 ;
Funnel : Salmon Pink, Black Top



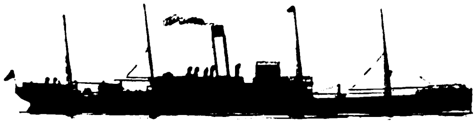
LLANDAFF CASTLE. LLANDOVERY CASTLE. Union Castle Line.
Length, 471 ft. 1 in ; Gross Tonnage, 10,786, and 10,699 ;
Funnel : Red, Black Top.



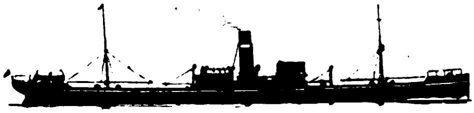
HERMINIUS. Shaw, Savill, and Albion Co. Length 477 ft. ; Gross Tonnage, 8,000;
Funnel : Buff, Black Top.



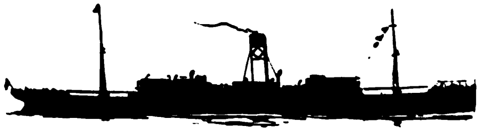
MAIDAN. MAHSUD. MAIHAR MALAKAND. MANAAR. MATHERAN.
Brocklebank. Length, 470 ft. 4 ins. ; Gross Tonnage, 8,077 ;
Funnel : Black, Blue and White Band. Black Top.



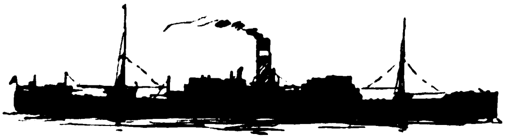
WARWICKSHIRE. **Bibby Line.** Length, 470 ft. 3 ins. ; Gross Tonnage, 7,126 ;
Funnel : Salmon Pink, Black Top



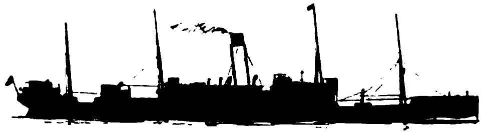
MALAKUTA. **Brocklebank.** Length, 470 ft. 2 ins. ; Gross Tonnage, 7,205 ;
Funnel : Black, Blue and White Band, Black Top.



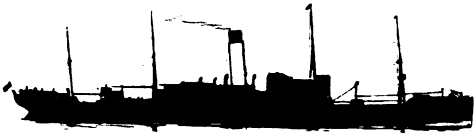
CALAMARES. PASTORES. United Fruit Co. Length, 470 ft.; Gross Tonnage, 7,782, and 7,242; Funnel: Buff, White Diamond on Red Band, Black Top.



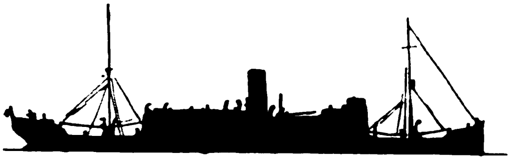
CITY OF NAGPUR. Ellerman City Line. Length, 469 ft. 9 ins.; Gross Tonnage, 10,138; Funnel: Buff, White Band, Black Top.



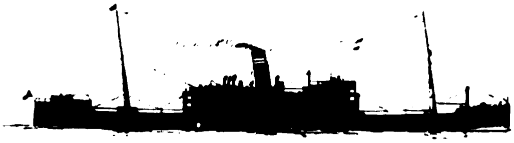
GLOUCESTERSHIRE. Bibby Line. Length, 467 ft. 2 ins.; Gross Tonnage, 8,124; Funnel: Salmon Pink, Black Top.



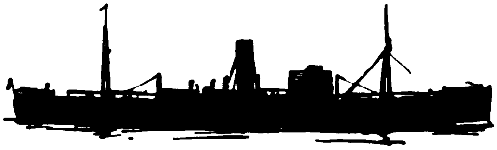
LEICESTERSHIRE. Bibby Line. Length, 467 ft. 2 ins.; Gross Tonnage, 8,059; Funnel: Salmon Pink, Black Top.



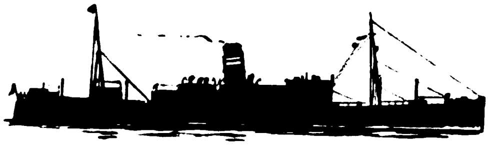
AMARAPOORA. Henderson Line. Length, 466 ft.; Gross Tonnage, 8,000; Funnel: Black.



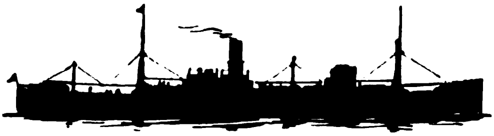
MADURA. MALDA. MANTOLA. MATIANA. British India S.N. Co. Length, 465 ft. 2 ins.; Gross Tonnage, 8,975; Funnels: Black, Two White Bands, Black Top



M.S. PORT DUNEDIN. M.S. PORT HOBART. Commonwealth and Dominion Line.
Length, 465 ft. ; Gross Tonnage, 7.500 ;
Funnel : Red, Black Top.

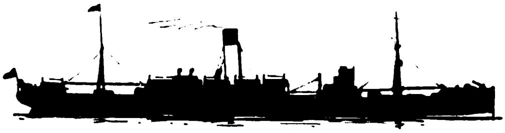


RAJULA. ROHNA. British India S. N. Co. Length, 460 ft. ;
Gross Tonnage, 8478 ;
Funnel : Black, Two close White Bands.

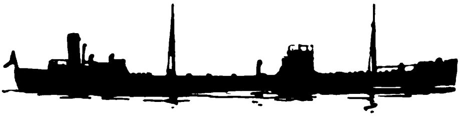


TURAKINA. TEKOA. TONGARIRO. New Zealand Shipping Co. Length, 460 ft. 5 ins.
Gross Tonnage. 8,565 ;
Funnel : Yellow.

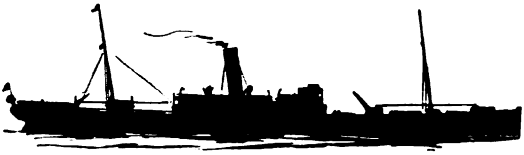
KENT. MIDDLESEX. SURREY. Federal Steam Nav. Co.
Funnel : Red, Black Top. St. George's Flag with Blue Square in centre, on Red.



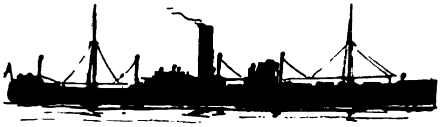
TAINUI. Shaw, Savill, and Albion Co. Length, 450 ft.; Gross Tonnage, 9,872 ;
Funnel : Buff, Black Top.



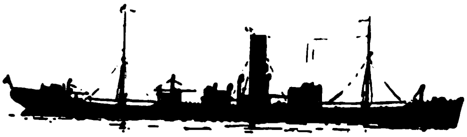
M.S. GULFCREST. Gulf Refining Co. of New York. Length, 460 ft ;
Gross Tonnage, 8,950.



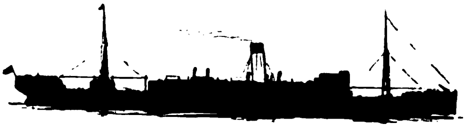
RUAPEHU. New Zealand Shipping Co. Length, 457 ft. 6 ins. ;
Gross Tonnage, 8,887 ;
Funnel : Yellow.



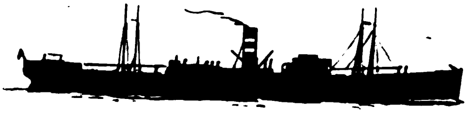
CITY OF LYONS. Ellerman Line. Length, 455 ft.; Gross Tonnage, 7,063;
Funnel: Buff, White Band, Black Top.



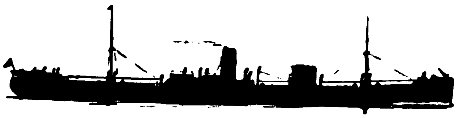
**AGAPENOR. AUTOLYCUS. AUTOMEDON. DARDANUS. ELPENOR. EUMAEUS.
GLAUCUS. HELENUS. LYCAON. MACHAON. MENTOR. MERIONES. PHEMIUS.
PYRRHUS. RHEXENOR. TEIRESIAS. TROILUS.** Blue Funnel Line.
Length, 455 ft. 2 ins.; Gross Tonnage, 7,587;
Funnel: Blue, Black Top.



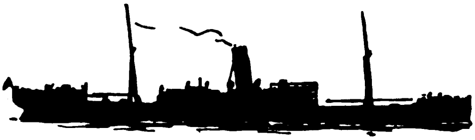
EL SALVADOR. COSTA RICA. Nederland Stoomvaart Maatschappij.
Length, 455 ft.; Gross Tonnage, 8,800;
Funnel: Buff, Black Top.



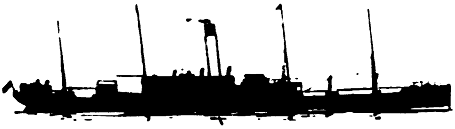
COLLEGIAN. Harrison Line. Length, 455 ft.; Gross Tonnage, 5,850;
Funnel: Black, Red Band between Two White.



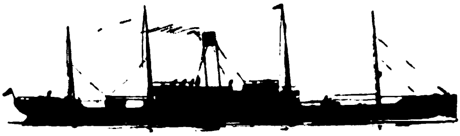
CLAN MACTAGGART. CLAN MACTAVISH. Clan Line. Length, 452 ft. 7 ins.,
and 469 ft.; Gross Tonnage, 7,602, and 7,619;
Funnel: Black, Two Red Bands.



**GARTH CASTLE. GRANTULLY CASTLE. GLOUCESTER CASTLE. GUILDFORD
CASTLE.** Union Castle. Length, 452 ft. 6 ins.; Gross Tonnage, 7,715;
Funnel: Red, Black Top.



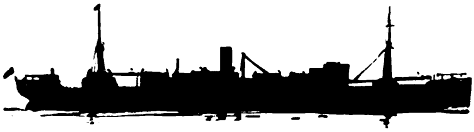
HEREFORDSHIRE. Bibby Line. Length, 452 ft. 8 ins.; Gross Tonnage, 7,126;
Funnel: Salmon Pink, Black Top.



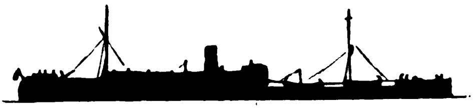
DERBYSHIRE. Bibby Line. Length, 452 ft.; Gross Tonnage, 6,168;
Funnel: Salmon Pink, Black Top.

MANUEL ARNUS. Compañia Trasatlantica. Length, 451 ft 6 ins.; Gross Tonnage, 7,578;
Funnel: Black.

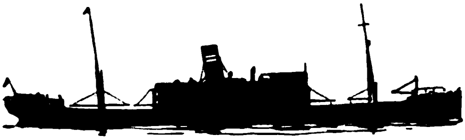
M.S. ACCRA. M.S. APAPA. Elder Dempster. Length, 450 ft. 7 ins.;
Gross Tonnage, 9,337 and 9,333;
Funnel: Buff.



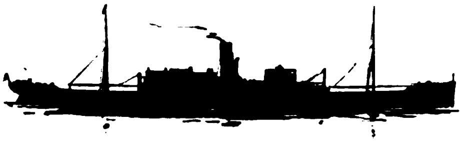
M.S. ABA. M.S. ADDA. Elder Dempster. Length, 450 ft. 5 ins. and 435 ft. 8 ins.;
Gross Tonnage, 7,937 and 7,816;
Funnel: Buff.



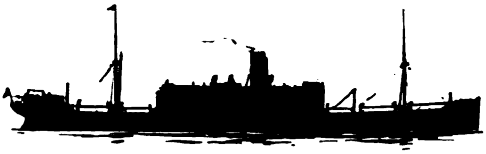
M.S. SOMERSETSHIRE. M.S. DORSETSHIRE. Bibby Line. Length, 450 ft. 8 ins.;
Gross Tonnage, 9,648, and 9,345;
Funnel: Pink, Black Top.



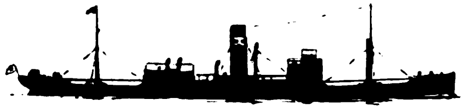
M.S. DOMALA. British India S.N. Co. Length, 450 ft.; Gross Tonnage, 8,441;
Funnel: Black, Two White Bands, Black Top.



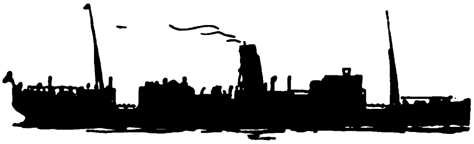
CIRCASSIA. Anchor Henderson. Length, 450 ft. ; Gross Tonnage, 7,180 ;
Funnel : Black.



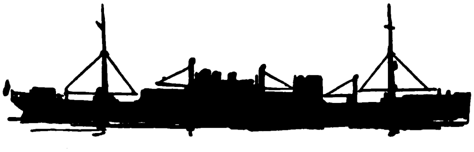
BRITANNIA. Anchor. Length, 450 ft. ; Gross Tonnage, 8,464 ;
Funnel : Black.



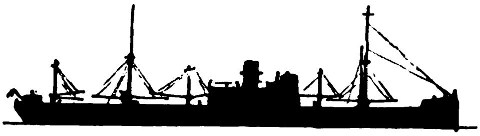
LONDON MARU. PARIS MARU. Osaka Shosen Kaisha. Length, 450 ft. ; Gross Tonnage, 7,600 ;
Funnel : Black, Two White Bands joined at Sides.



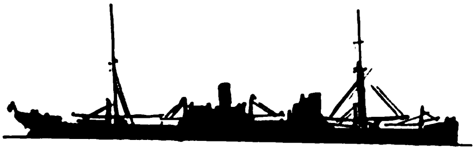
MAKURA. Union Steam Ship Co. of N.Z. Length, 450 ft. ; Gross Tonnage, 8,075 ;
Funnel : Red, Black Top.



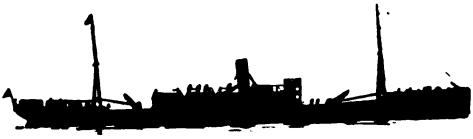
M.S. ESQUILINO. M.S. VIMINALE. Lloyd Triestino. Length, 450 ft. and 467 ft. 5 ins. ;
Gross Tonnage, 8,657.



MANCHESTER REGIMENT. LONDON IMPORTER. LONDON MERCHANT.
Furness Lines. Length, 450 ft. ; Gross Tonnage. 7,900 ;
Funnel : Red, Black Top, Black Base and Black Band.

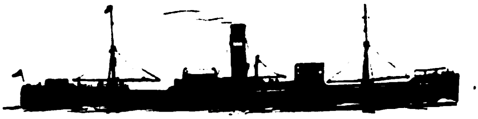


M.S. DURENDA. British India. Length, 450 ft. ; Gross Tonnage, 7,200 ;
Funnel : Black, Two Narrow White Bands.

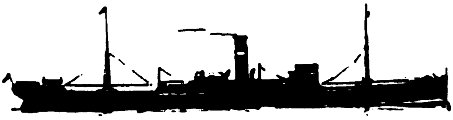


NANKIN. NOVARA. P. & O. Line. Length, 449 ft. 7 ins.; Gross Tonnage, 7,058;
Funnel: Black.

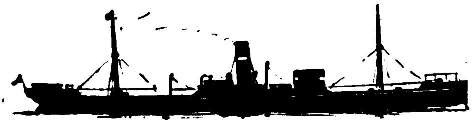
NELLORE. Eastern and Australian Line.
Funnel: Black.



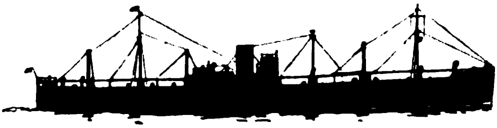
MASIRAH. Anchor-Brocklebank Line. Length, 448 ft.; Gross Tonnage, 6,836;
Funnel: Black, Blue and White Band, Black Top.



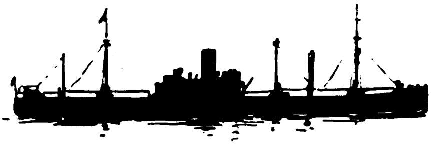
ANCHORIA. Anchor-Brocklebank Line. Length, 446 ft. 4 ins.; Gross Tonnage, 6,112;
Funnel: Black, Blue and White Band, Black Top.



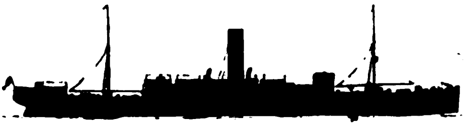
MAHRATTA. MAKALLA. Anchor-Brocklebank Line. Length, 445 ft.; Gross Tonnage, 6,690;
Funnel: Black, White Band, Blue and White Stripe Band, Black Top.



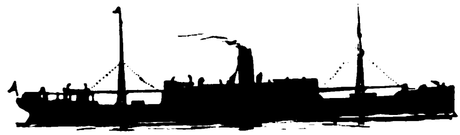
CINGALESE PRINCE. Rio Cape Line. Length, 441 ft. 8 ins.; Gross Tonnage, 6,750;
Funnel: Black, Two Red Bands, Feathers on side.



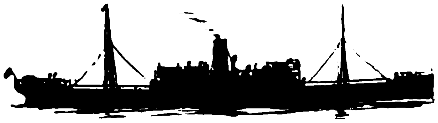
**M.S. CHINESE PRINCE. M.S. JAPANESE PRINCE. M.S. JAVANESE PRINCE.
M.S. MALAYAN PRINCE.** Rio Cape Line. Length, 441 ft.; Gross Tonnage, 6,734;
Funnel: Black, Two Red Bands, feathers on side.



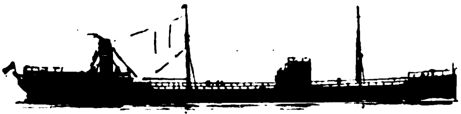
HILDEBRAND. Booth Line. Length, 440 ft. 8 ins.; Gross Tonnage, 6,995;
Funnel: Black.



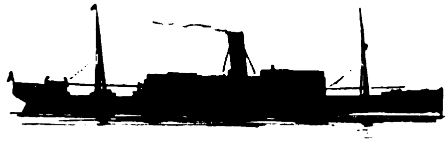
ANTONIO LOPEZ. Compañia Trasatlantica. Length, 440 ft.; Gross Tonnage, 5,975; Funnel: Black.



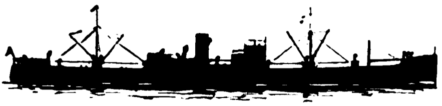
ELYSIA. Anchor. Length, 440 ft.; Gross Tonnage, 6,368; Funnel: Black.



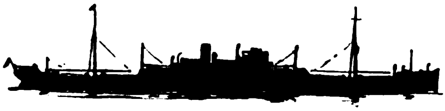
BRITISH MERCHANT. British Tanker Co. Length, 440 ft.; Gross Tonnage, 7,400; Funnel: Red, White Band, Black Top; Green Band on White.



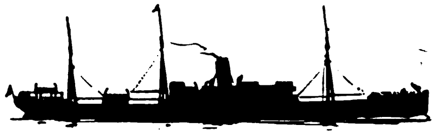
ZEELANDIA. Holland Lloyd. Length, 440 ft.; Gross Tonnage, 7,996; Funnel: Yellow, Black Band.



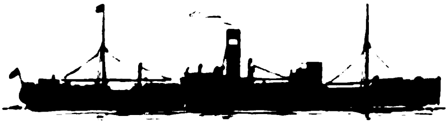
M.S. PACIFIC RELIANCE. M.S. PACIFIC ENTERPRISE. M.S. PACIFIC RANGER. Furness Withy Length, 435 ft.; Gross Tonnage, 6,570; Funnels: Black, Red, Thin Black and Red Band, Black Top.



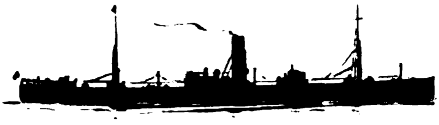
M.S. GLENAMOY. Glen Line. Length, 435 ft.; Gross Tonnage, 7,269; Funnel: Red, Black Top.



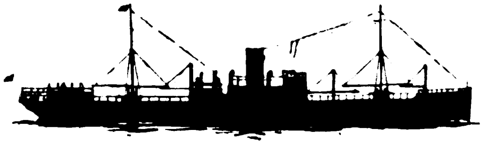
MANUEL CALVO. Compañia Trasatlantica. Length 435 ft.; Gross Tonnage, 5,617; Funnel: Black.



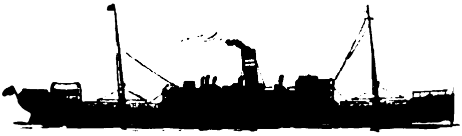
CITY OF NORWICH. Ellerman (Hall Line). Length, 434 ft. 4 ins.; Gross Tonnage, 6,726; Funnel: Buff, White Band, Black Top.



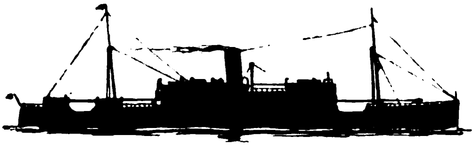
NAGINA. British India Steam Navigation Co. Length, 433 ft.; Gross Tonnage, 6,650; Funnel: Black, Two White Bands.



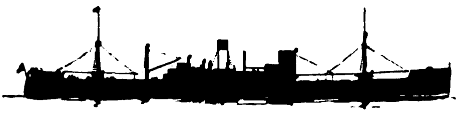
TJIBADAK. Java-China-Japan Line. Length, 433 ft.; Gross Tonnage, 7,803; Funnel: Black.



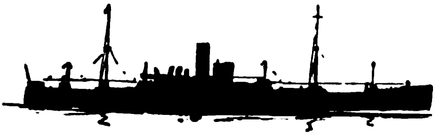
TAKADA. British India S.N. Co. Length, 430 ft. 1 in.; Gross Tonnage, 6,949; Funnel: Black, Two White Bands, Black Top.



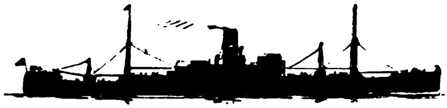
M.S. WESTRALIA. Huddart Parker. Length, 430 ft.; Gross Tonnage, 8,108; Funnel: Yellow.



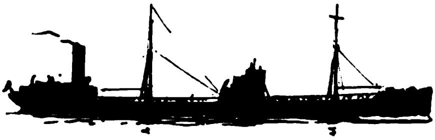
M.S. LEIGHTON. M.S. LINNELL. Lamport and Holt. Length, 430 ft.; Gross Tonnage, 7,412; Funnel: Light Blue, White Band, Black Top.



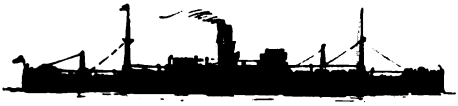
M.S. UPWEY GRANGE. M.S. EL ARGENTINO. Furness-Houlder. Length, 430 ft.; Gross Tonnage, 9,100; Funnel: Black, Red Band with White Maltese Cross, Black Top.



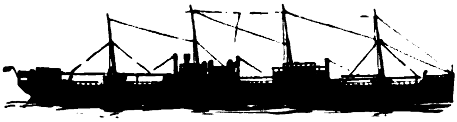
HARDWICKE GRANGE. **Furness-Houlder.** Length, 430 ft.; Gross Tonnage, 9,005; Funnel: Black, Red Band with White Maltese Cross, Black Top.



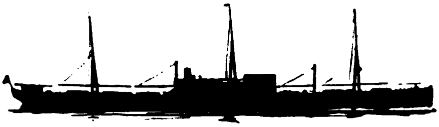
BRITISH INVENTOR. **British Tanker Co.** Length, 430 ft.; Gross Tonnage, 7,200; Funnel: Red, White Band, Black Top: Green Band on White.



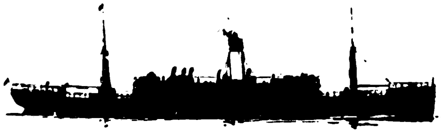
MARQUESA. BARONESA. CANONESA. DUQUESA, PRINCESA. **Furness-Houlder.** Length, 430 ft.; Gross Tonnage, 8,979; Funnel: Black, Red Band with White Maltese Cross, Black Top.



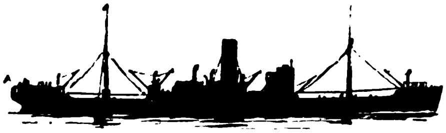
M.S. ALSIA. **East Asiatic Co.** Length, 427 ft.; Gross Tonnage, 5,812.



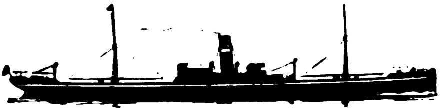
M.S. BALBOA. M.S. BUENOS AIRES. M.S. CANADA. **Axel Axelson Johnson.** Length, 426 ft.; Gross Tonnage, 5,455.



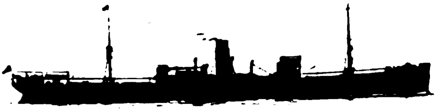
BAYANO. CAMITO. CORONADO. ARIGUANI. CARARE. CAVINA. **Elders and Fyffes.** Length, 425 ft. 5 ins.; Gross Tonnage, 6,788; Funnel: Buff, Black Top.



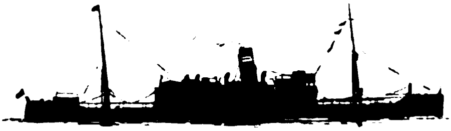
M.S. EURYBATES. **Blue Funnel Line.** Length, 425 ft.; Gross Tonnage, 6,400; Funnel: Blue, Black Top.



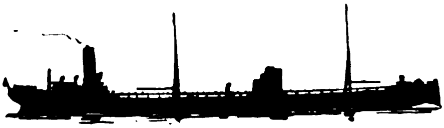
STOCKWELL. Anchor-Brocklebank Line. Length, 425 ft.; Gross Tonnage, 5,643; Funnel: Black, Blue and White Band, Black Top.



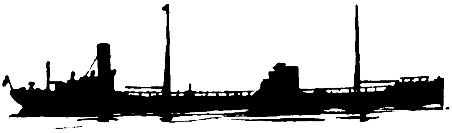
CAIRNROSS. Cairns, Noble & Co. Length, 425 ft.; Gross Tonnage, 5,494; Funnel: Black, Red Band, White Triangle.



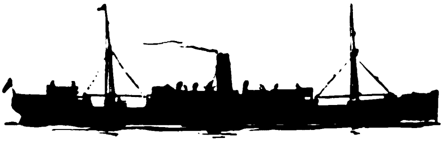
KARAGOLA. KHANDALIA. British India S.N. Co. Length. 425 ft.; Gross Tonnage, 7,053; Funnel: Black, Two White Bands, Black Top.



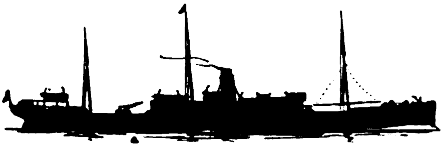
TUSCARORA. Anglo American Oil Co. Length, 425 ft.; Gross Tonnage, 7,106; Funnel: Red, Black Top.



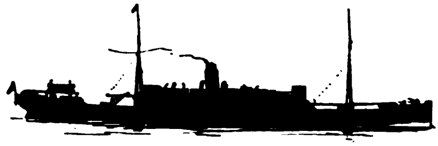
M.S. NARRAGANSETT. Anglo American Oil Co.
Length, 425 ft.; Gross Tonnage, 6,889;
Funnel: Red, Black Top.



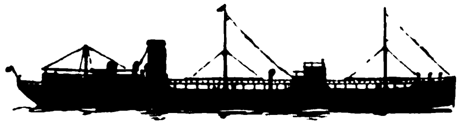
BUENOS AIRES. Compañia Trasatlantica. Length, 422 ft.; Gross Tonnage, 5,311; Funnel: Black.



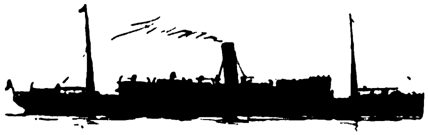
MONTEVIDEO. Compañia Trasatlantica. Length, 422 ft. Gross Tonnage, 5,205; Funnel: Black.



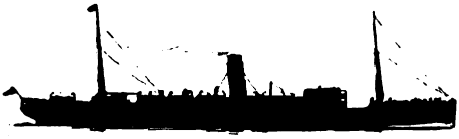
LEON XIII. Compañia Trasatlantica. Length, 421 ft.; Gross Tonnage, 5,086; Funnel: Black.



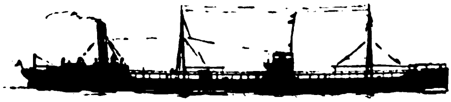
M.S. MEGARA. MIRZA. Anglo-Saxon Petroleum Co Length, 421 ft.; Gross Tonnage, 7,992; Funnel: Buff, Black Top.



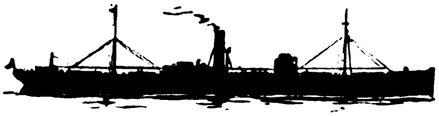
KAROOLA. KATOOMBA. McIlwraith, McEacharn. Length, 420 ft. 5 ins.; Gross Tonnage, 7,391; Funnel: Red, Black Top.



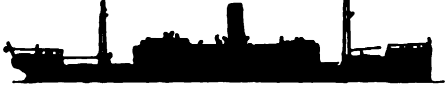
MARAMA. Union Steamship Co. of N.Z. Length, 420 ft. 3 ins.; Gross Tonnage, 6,497; Funnel: Red, Black Top.



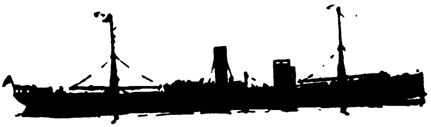
SAN DUNSTANO. SAN EDUARDO. SAN SILVESTRE. SAN TIRSO. SAN VALERIO. SAN ZEFERINO. Eagle Oil Transport Co., Ltd.
Length, 420 ft. 2 ins.; Gross Tonnage, 6,220;
Funnel: Black, Yellow Band, Black Eagle, Black O on White Band, Yellow Band.
SAN RICARDO. Cia. Navigazione San Ricardo.



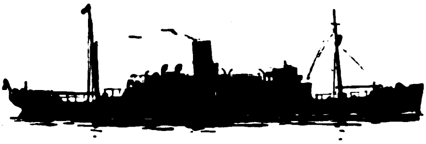
ALNMOOR. CASTLEMOOR. Runciman. Length, 420 ft.; Gross Tonnage, 6,578; Funnel: Black, White Band, Blue R.



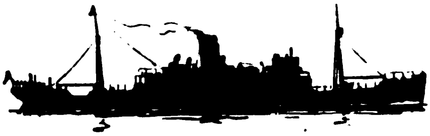
PATUCA. Elders and Fyffes. Length, 417 ft.; Gross Tonnage, 6,100; Funnel: Buff, Black Top.



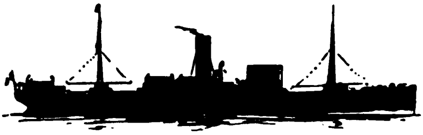
CAIRNVALONA. **Cairns, Noble & Co.** Length, 415 ft. 2 ins.; Gross Tonnage, 4,929;
Funnel: Black, Red Band, White Triangle.



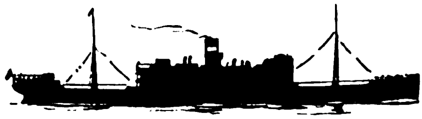
LADY DRAKE. LADY HAWKINS. LADY NELSON. **Canadian National (West Indies) Steamships, Ltd.** Length, 415 ft.; Gross Tonnage, 7,650;
Funnel: Red, White Band, Blue Top.



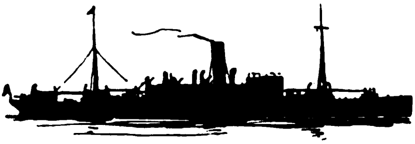
LADY RODNEY. LADY SOMERS. **Canadian National Steamships.** Length, 415 ft.; Gross Tonnage, 7,650;
Funnel: Red, White Band, Blue Top.



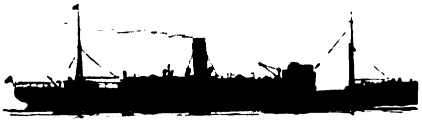
D'ENTRECASTEAUX. FORBIN. **Chargeurs Réunis.** Length, 415 ft.; Gross Tonnage, 7,563;
DUPLEIX. " " " " " 7,418;
ANGO. " " " " " 7,393;
BOUGAINVILLE. " " " 413 ft.; " 7,293;
Funnel: Yellow, Red Stars on White Band.



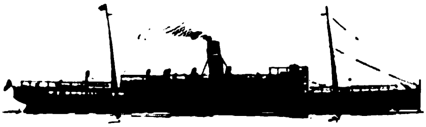
MUNARGO. **Munson Steamship Co.** Length, 415 ft.; Gross Tonnage, 6,484;
Funnel: Blue, White Band, Black Top.



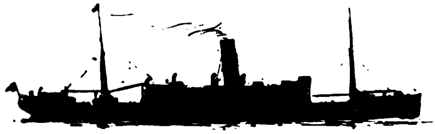
BELVEDERE. **Cosulich Line.** Length, 412 ft.; Gross Tonnage, 7,305;
Funnel: Red, White Band, Black Top.



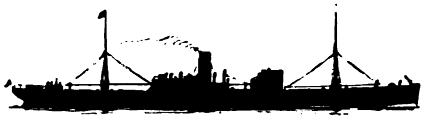
FORT ST. GEORGE. **Furness Withy.** Length, 411 ft. 3 ins.; Gross Tonnage, 7,785;
Funnel: Black, Red, Thin Black and Red Bands, Black Top.



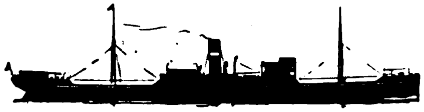
ERINPURA. **British India S.N. Co.** Length, 411 ft.; Gross Tonnage, 5,128; Funnel: Black, Two White Bands, Black Top.



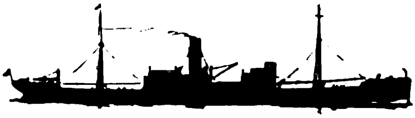
ZEALANDIA. **Huddart, Parker.** Length, 410 ft.; Gross Tonnage, 7,000; Funnel: Yellow.



CLAN MACNAB. CLAN MACNAIR. CLAN MACNAUGHTON. CLAN MACNEIL. CLAN MONROE. CLAN MORRISON. CLAN MURDOCH. CLAN MURRAY. Clan Line. Length, 410 ft. 6 ins.; Gross Tonnage, 6,114; Funnel: Black, Two Red Bands.

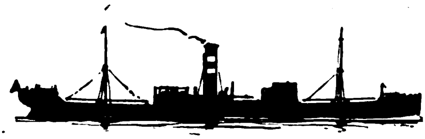


MEDIA. **Anchor-Brocklebank.** Length, 410 ft.; Gross Tonnage, 5,437; Funnel: Black, Blue and White Band, Black Top.

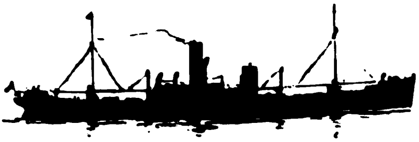


OCEAN PRINCE. **Furness Withy.** Length, 410 ft.; Gross Tonnage, 5,212, Funnel: Black, Red, Thin Black and Red Bands, Black Top.

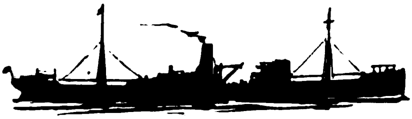
ELLENGA. **British India S.N. Co.** Length, 410 ft.; Gross Tonnage, 5,196; Funnel: Black, Two White Bands, Black Top.



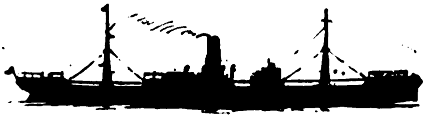
DRAMATIST. **Harrison Line.** Length, 410 ft.; Gross Tonnage, 5,443: Funnel: Black, Red Band between Two White.



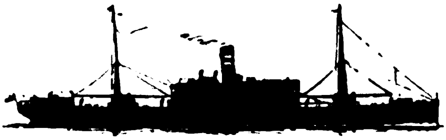
BASIL. BONIFACE. BENEDICT. Booth Line. Length, 407 ft. 8 ins ; Gross Tonnage, 4,677
Funnel : Black.



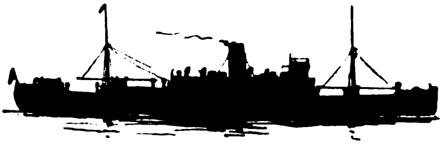
EGBA. Elder Dempster. Length, 406 ft. ; Gross Tonnage, 4,989 ;
Funnel : Buff.



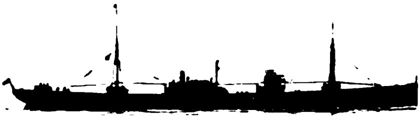
EBOE. Elder Dempster. Length, 405 ft. 1 in. ; Gross Tonnage, 4,866 ;
Funnel : Buff.



JAMAICA MERCHANT. Jamaica Direct Fruit Line. Length, 405 ft. ; Gross Tonnage, 7,881 ;
JAMAICA PLANTER. ,, ,, ,, ,, 413 ft. ; ,, 7,498 ;
JAMAICA PRODUCER. ,, ,, ,, ,, 413 ft. ; ,, 7,490 ;
JAMAICA SETTLER. ,, ,, ,, ,, 413 ft. ; ,, 7,490 ;
Funnel : Blue, Two White Bands, Black Top.

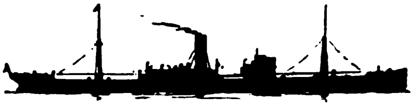


NEWFOUNDLAND. NOVA SCOTIA. Warren Line (Furness Withy). Length, 405 ft. ;
Gross Tonnage, 6,820 ;
Funnel : Black, Red, Thin Red and Black Bands.

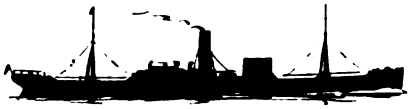


M.S. LOUISIANA. Det Forenede Dampskibs Selskab. Length, 405 ft. ; Gross Tonnage, 6,518 ;
Funnel : Flamingo, Red, Black Top.

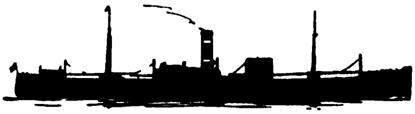
DAGHESTAN. Oil Tanker. Hindustan Steam Shipping Co. Length, 408 ft. ;
Gross Tonnage, 5,742 ;
Funnel : Black, Two White Bands, Vermilion Between, C in White.



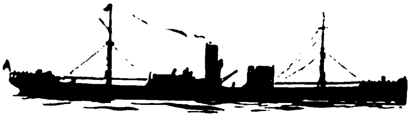
M.S. GLENLUCE. Glen Line. Length, 405 ft. ; Gross Tonnage, 6,755 ;
Funnel : Red, Black Top.



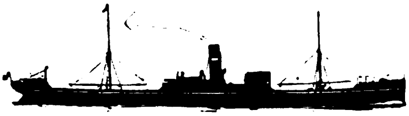
**KALIMBA ROMERA. Maclay and McIntyre. Length, 402 ft. 3 ins. ; Gross Tonnage, 4897 ;
Funnel : Yellow, Black Top.**



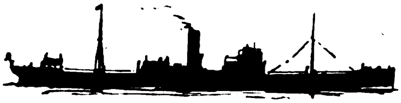
BREDA. Koninklijke Nederlandsche Stoomboot Mij. Length, 402 ft. ;
Gross Tonnage, 6,915 ;
Funnel : Black, Two White Bands.



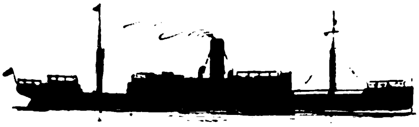
CAIRNESK. & CAIRNGLEN. Cairn Line. Length, 401 ft. 9 ins. ; Gross Tonnage, 5,000 ;
Funnel : Black, White Diamond on Red Band.



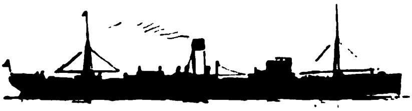
HOLYWELL. Anchor-Brocklebank. Length, 401 ft. 8 ins. ; Gross Tonnage, 4,867 ;
Funnel : Black, White Band, Blue and White Stripe Band, Black Top.



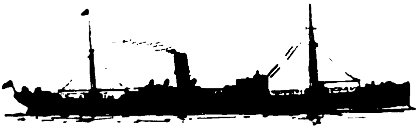
HALIZONES. Houston Line. Length, 400 ft. 8 ins. ; Gross Tonnage, 5,273 ;
Funnel : Red, Two Black Bands, Black Top.



ABINSI. Elder Dempster. Length, 400 ft. 5 ins. ; Gross Tonnage, 6,365 ;
Funnel : Buff.

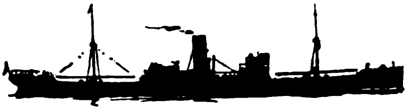


NORWEGIAN. **Leyland Line.** Length, 400 ft. 2 ins.; Gross Tonnage, 6,857;
Funnel: Buff, Black Top.

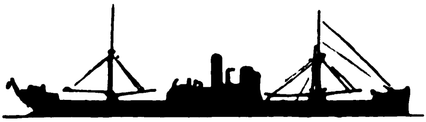


MANISTEE. PATIA. ZENT. **Elders and Fyffes.** Length, 400 ft. 2 ins.; Gross Tonnage, 5,860;
Funnel: Buff, Black Top.

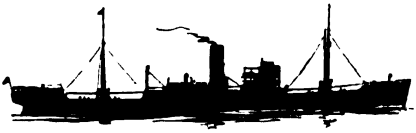
EDAVANA, ELEPHANTA. **British India S.N. Co.** Length, 400 ft.; Gross Tonnage, 5,284;
Funnel: Black, Two White Bands, Black Top.



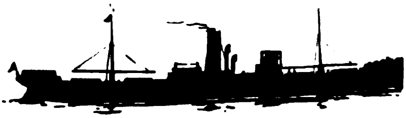
CANADIAN VICTOR. **Canadian Government Merchant Marine.** Length, 400 ft.;
Gross Tonnage, 5,493;
Funnel: Yellow, Black Top.



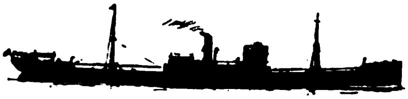
**BADAGRY. BARRACOO. BASSA. BATA. BATHURST. BEREBY. BIAFRA.
BODNANT. BOUTRY. BOMA. BURUTU.** **Elder, Dempster.**
Length, 400 ft.; Gross Tonnage, 5,300;
Funnel: Buff.



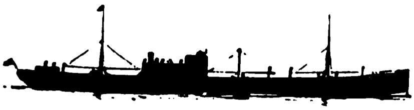
M.S. DOLIUS. M.S. MEDON. **Blue Funnel Line.** Length, 400 ft.; Gross Tonnage, 5,700;
Funnel: Blue, Black Top.



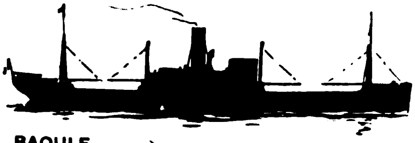
ORANGEMOOR. FERNNOOR. **Runciman.** Length, 399 ft. 6 ins.; Gross Tonnage, 6,573;
Funnel: Black, White Band, Blue R.



CAIRNDHU. CAIRNGOWAN. **Cairns, Noble & Co.** Length, 399 ft. 3 ins., and 400 ft.; Gross Tonnage, 5.250, and 5,295; Funnel: Black, Red Band, White Triangle.

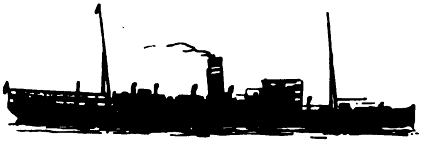


M.S. LULE. **Grängesberg Oxelösund Co.** Length, 399 ft.; Gross Tonnage, 5,680; Funnel: Buff, Blue Band, Gold Emblem.

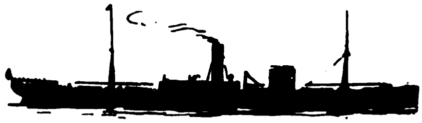


BAOULE.
DAHOMEY
ADRAR.

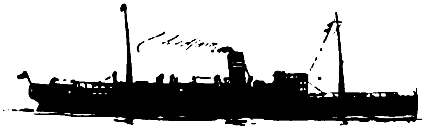
} **Chargeurs Réunis.** Length, 391 ft.; Gross Tonnage, 5,900;
„ „ „ „ „ „ 5,855;
Funnel: Yellow, Red Stars on White Band.



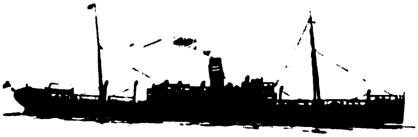
ANGORA. **British India S.N. Co.** Length, 390 ft. 8 ins.; Gross Tonnage, 4,298; Funnel: Black, Two White Bands, Black Top.



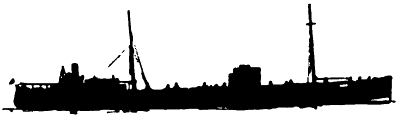
CAIRNMONA. **Cairns, Noble & Co.** Length, 390 ft. 2 ins.; Gross Tonnage, 4,666; Funnel: Black, Red Band, White Triangle.



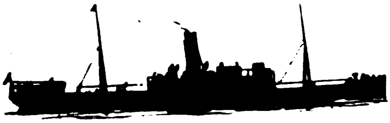
ARONDA. **British India S.N. Co.** Length, 390 ft. 2 ins.; Gross Tonnage, 4,062; Funnel: Black, Two White Bands, Black Top.



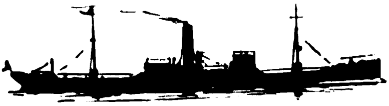
VARELA. VARSOVA. VITA. VASNA. **British India S.N. Co.** Length, 390 ft. 1 in.; Gross Tonnage, 4,645; Funnel: Black, Two White Bands, Black Top.



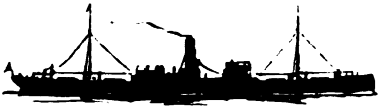
OLJAREN. Transatlantic S.S. Co. Length, 389 ft.; Gross Tonnage, 5,450; Funnel: Yellow, Black Top.



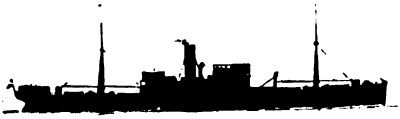
LEGAZPI Compañia Trasatlantica. Length, 389 ft.; Gross Tonnage, 4,339; Funnel: Black.



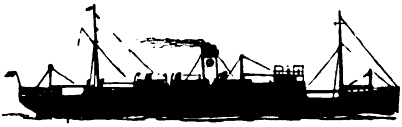
HALESIUS. Houston Line. Length, 385 ft.; Gross Tonnage, 4,652; Funnel: Red, Black Top.



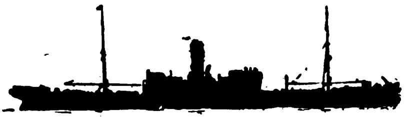
HESPERIDES. Houston Line. Length, 382 ft. 5 ins.; Gross Tonnage, 3,914; Funnel: Red, Black Top.



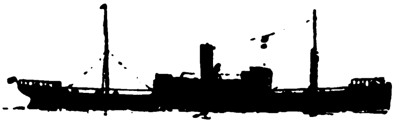
DENIS. STEPHEN. Booth Line. Length, 376 ft. 4 ins.; Gross Tonnage, 4,435; Funnel: Black.



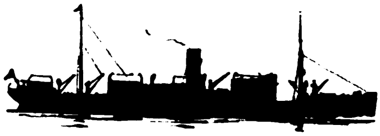
BRITANNIA. SUECIA. Swedish Lloyd. Length, 375 ft., Gross Tonnage, 4,500; Funnel: White; Yellow Star on Blue Disc, Black Top.



AIDAN. Booth Line. Length, 375 ft. 9 ins.; Gross Tonnage, 4,545; Funnel: Black.



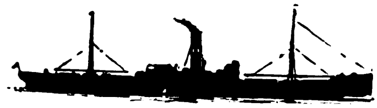
ALBAN. Booth Line. Length, 375 ft. 2 ins.; Gross Tonnage, 5,223;
Funnel: Black.



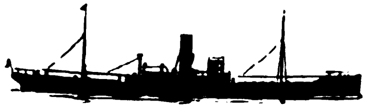
M.S. ITAPAGÉ. S.S. ITAIMBÉ. S.S. ITAHITÉ. Companhia Nacional Di Navegacao Costiero. Length, 370 ft.; Gross Tonnage, first named, 4,600 tons; others, 4,993;
Funnels: Black, Brass Maltese Cross.

M.S. ITAPÉ. Companhia Nacional di Navigaçao Costiero Length, 370 ft.;
Gross Tonnage, 5,000;
Funnel: Black, Brass Maltese Cross.

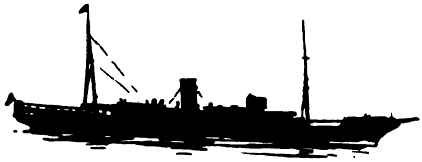
EUROPE. Chargeurs Réunis. Length, 369 ft.; Gross Tonnage, 5,453;
Funnel: Yellow, Red Stars on White Band.



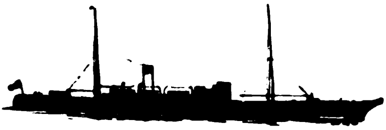
SANTA·AURORA. Eagle Oil Transport Co., Ltd. Length, 367 ft. 5 ins.; Gross Tonnage, 4,278;
Funnel: Black Yellow Band, Black Eagle, Black O on White Band, Yellow Band.



HESIONE. Houston Line. Length, 361 ft. 7 ins.; Gross Tonnage, 4,125;
Funnel: Red, Black Top.

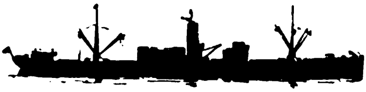


M.S. STELLA POLARIS. Bergen Steamship Co. Length, 360 ft.; Gross Tonnage, 5,020;
Funnel: Yellow.

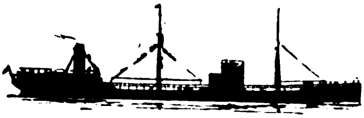


JOHN W. MACAY. Commercial Cable Co., N.Y. Length, 360 ft.; Gross Tonnage, 4,049;
Funnel: Buff, Black Top.

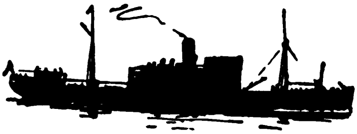
BEN MY CHREE. Isle of Man Steam Packet Co. Length, 355 ft.; Gross Tonnage, 2,587;
Funnel: Red, Black Top.



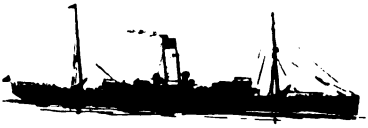
CUTHBERT. Booth Line. Length, 355 ft.; Gross Tonnage, 3,843;
Funnel: Black.



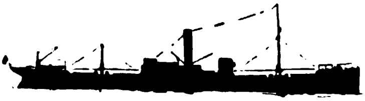
BRITISH COMMERCE. BRITISH ENTERPRISE. BRITISH TRADER. British Tanker Co.
Length, 351 ft. 4 ins.; Gross Tonnage, 4,205;
Funnel: Red, White Band, Green Top: Green Band on White.



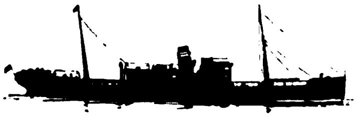
CHANGTE. TAIPING. Australian-Oriental Line. Length, 350 ft.; Gross Tonnage, 4,324;
Funnel: Buff.



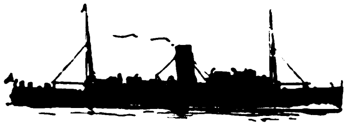
REGELE CAROL I. Roumanian State. Length, 350 ft.; Gross Tonnage, 2,370;
Funnel: White, Black Top.



POLYCARP. Booth Line. Length, 340 ft. 7 ins.; Gross Tonnage, 3,577;
Funnel: Black.

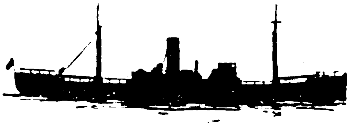


BARODA. British India S.N. Co. Length, 330 ft. 4 ins.; Gross Tonnage, 3,172;
Funnel : Black, Two white Bands, Black Top.

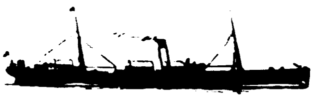


ISLE OF THANET. MAID OF KENT. Southern Railway. Length, 329 ft.;
Gross Tonnage, 2,664;
Funnel: Buff, Black Top.

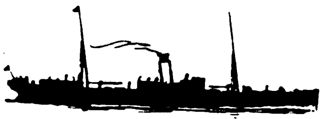
CANTERBURY. Southern Railway Co. Length, 320 ft.; Gross Tonnage, 2,912;
Funnel: Buff, Black Top.



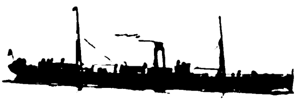
LA PERLA. M.S. LA PLAYA. United Fruit Co. Length, 325 ft.;
Gross Tonnage, 3,830;
Funnel: Buff. White Diamond on Red Bank, Black Top.



SLIEVE BAWN. SLIEVE MORE. London, Midland and Scottish Railway.
Length, 300 ft. 2 ins.; Gross Tonnage, 1,061;
Funnel: Yellow, Black Top.



SLIEVE DONARD. London, Midland and Scottish Railway.
Length, 300 ft.; Gross Tonnage, 1,116;
Funnel: Yellow, Black Top.



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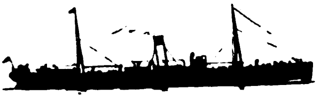

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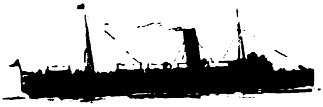

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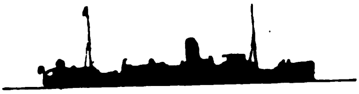

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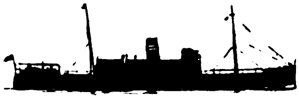

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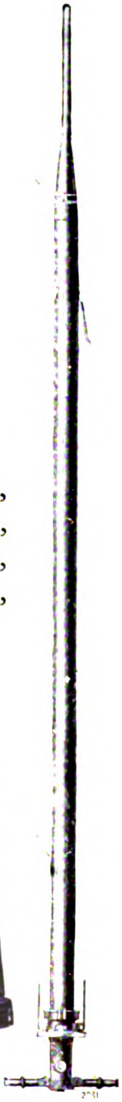

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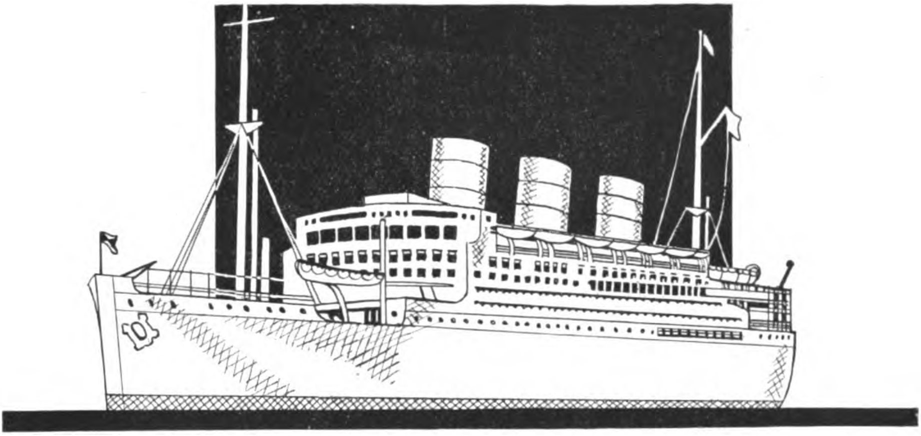

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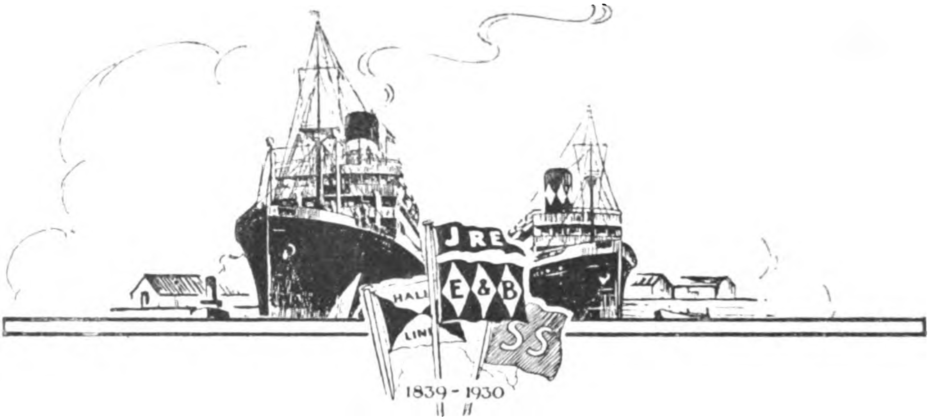

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b. battleship; *b.cr.* battle cruiser; *cr.* cruiser; *a.cr.* armoured cruiser; *air.c.* aircraft carrier; *f.l.* flotilla leader; *l.cr.* light cruiser; *cr.m.l.* = cruiser mine-layer; *s.cr.* scout cruiser; *s.cl.cr.* second-class cruiser; *tr. cr.* = training cruiser; *d.* destroyer; *t.b.d.* torpedo-boat destroyer; *c.d.* coast defence ship.

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b. battleship; *b.cr.* battle cruiser; *cr.* cruiser; *a.cr.* armoured cruiser; *air.c.* aircraft carrier; *f.l.* flotilla leader; *l.cr.* light cruiser; *cr.m.l.* = cruiser mine layer; *s.cr.* scout cruiser; *s.cl.cr.* second-class cruiser; *d.* destroyer; *t.b.d.* torpedo-boat destroyer; *c.d.* coast defence ship.

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